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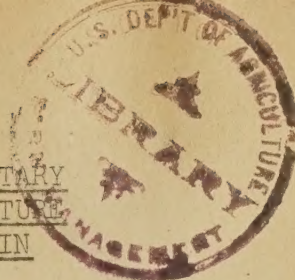
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REMARKS MADE BY SECRETARY MEREDITH, ASSISTANT SECRETARY
BALL AND OTHER MEMBERS OF THE DEPARTMENT OF AGRICULTURE
AT A CONFERENCE OF STATE EXTENSION DIRECTORS, HELD IN
WASHINGTON, FEBRUARY 1, 2 and 3, 1921.



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THE CHAIRMAN, DR. A. C. TRUE: By direction of the Committee having charge of the arrangements for this conference, I have been asked to call the meeting to order. The Extension Directors from the several States are here in response to the invitation of the Secretary of Agriculture in order that they may get in closer touch and become better acquainted with the organization and workings of the Department of Agriculture, particularly along those lines which are of immediate interest and value in connection with extension work. Secretary Meredith is here in person this morning to welcome you and I take great pleasure in presenting him at this time.

SECRETARY MEREDITH: Ladies and Gentlemen: It is a very great pleasure to me to welcome you, the Extension Directors from the various States, as well as the extension workers, to Washington for the purpose of becoming more acquainted with the organization and workings of the Department of Agriculture and in closer contact with it. I might say it is a peculiar pleasure because I have a very great interest in the extension work. It seems to me that if we could have the people, especially the farmers, of the country realize thoroughly the value of research work as a foundation for agricultural activities and then the very great work that is being done by the extension workers in carrying to the people, the farmers, the results of the research work, there would be no trouble about going forward with an agricultural program so far as is necessary, by the appropriation of larger funds, the securing of better people for the personnel and a better reception on the part of

those we want most to help, so that the farmer may rely more on the Department of Agriculture for his information and that the people may take a fairer attitude towards the Department. The value to the farmers themselves of the work that you men and women are doing can not be questioned by anybody now. A few years ago there was some question, as you know. That, you have broken down. When you used to go out to the farmers and try to tell them some of the lessons learned in agriculture, some of the better methods, some of the improved methods, they came back with the proposition that they were practical farmers and that they did not care for book farming. They did not care particularly for the college farmer, but that has been quite some time ago and today they have come to accept very much more readily the lessons that have been learned by research. I was talking to a group of farmers out in Iowa trying to show them that almost everything they called practical agriculture showed the effect of research work plus demonstration by the extension workers and that that backed up balanced feed and balanced rations for stock, and discussed for a while those which had value, the elements of value in the different feeds, and then told them what they had to feed for milk, for beef, and for bone, etc. And while they had thought first that they were practical farmers and feeders, when we got through it finally entered their minds that it was scientific farming. When we told them about rotation of crops, they said that was old, they had tried that. I tried to show what went into the elements of the soil, what into plant life, and asked if that was not scientific. We went on to demonstrate that practically everything in agriculture is actually the result of careful research work and then demonstration by people who have carried the lesson out.

I remember not long ago I was at a little gathering in Iowa, I was kind of a booster to the show, getting people to come in and hear the talk on feeding hogs. One gentlemen stopped and I asked him to go in and he asked what they were doing and I said, "talking on feeding hogs." He said, "That's my business," and I said, "Well, you are just the man we want." He said, "If you feed a hog all he will eat, he will come along alright." The expense of this over feeding he did not seem to take into consideration, nor the resultant harm from it. If the question of feeding hogs, the methods of increasing pork, the proper feeding, etc., were not studied out by research the results would be disastrous. That is why we have our scientists trained in this line of work who are constantly studying out methods and means of reducing the amount of food and increasing the amount of pork, causing expenses to be reduced and income increased. While some of the livestock men of the country have discovered this and are taking advantage of the information sent out from the Department I believe that the great majority will soon change their attitude and accept the advice of the men sent out to show them and aid them in their undertaking. The problems are so great that they carry these things to the farmers. For instance, results of some work carried over the last three years have just been put together for you. As I told an audience out West the other day, corn has rheumatism. I do not claim to be the scientific agriculturist many of you folks are, so I said corn had rheumatism. Take corn that is half of it corn rot and take corn they know is healthy. There is not so much acid in the juice of the diseased corn as in healthy corn and consequently it does not carry iron in solution, with the result that the ear does not get as much plant food, does not mature as well as the healthy corn, but it does get old in

face, and like a man with rheumatism it looks mature. And the farmers of Iowa, Illinois and Kansas have for many years been very carefully picking out the diseased seed corn because they have been picking out what they thought was the early maturing ears, but the early maturing ears as they had selected them have an old look and are diseased. I know a man who has a reputation of being one of the big corn men in Iowa and you can not tell him anything. He is a successful farmer. You will have to prove to that fellow by actual demonstration that he is picking out diseased ears rather than the healthy ears, so there comes the problem of the extension worker and demonstration people in getting the results of this research to the farmers. I can not emphasize too much to this group, the importance of this extension work and the value that it is to the country to get the lessons of the research work. As I see it, the research worker of the Department of Agriculture and the Experiment Stations - the researchers all over the United States - they are manufacturers. They turn out a product of service but that service to really be of value to the people must be carried to them and must be demonstrated and must be sold, and the demonstration and extension workers are the selling branch of the factory, carrying out the production. And it is a pleasure and a particular satisfaction to me that during the short time I will be here you will come to the Department of Agriculture and get a little closer touch with the factory end of the business, if we may put it that way. It seems to me too that there is a very great need, possibly not on the part of you ladies and gentlemen for that contact but certainly on the part of everyone excepting yourselves and I certainly do not know of anyone except yourselves I would except. Forty-five agricultural editors asked to study the Department of Agriculture to learn of

its services and I do not want to run down the profession from which I get my bread and butter, because I do not, as many of you do not, get it from the salary you draw, but it is deplorable that the agricultural editors of this country are not better informed of the services to be rendered by the Department of Agriculture. One of the men said we ought to do a good deal of work on cooperative enterprises, that we ought to study cooperation and that we ought to take some interest in it. He was an editor of one of the largest agricultural papers of the Northwest, a paper with a circulation of 150,000 to 175,000 - a real farm paper. When we told him that we were not running a propaganda bureau for or against cooperation, that we were a research bureau and then that we had our extension workers to carry out the lessons of successful cooperative enterprises, to tell them of those that had value and to help those that really thought they wanted to work through cooperation, to study the successes and failures, and that we were in touch with 14,000 organizations, etc., he said he had written to every cooperative organization he could think of, that he had written to everyone in the South and he had tried to get hold of their constitutions and by-laws and he had found from that meeting that he could have gotten more from the Department of Agriculture than he had gotten for all of his time and dollars and it would have been very much better. I asked these editors if there was any criticism, if there was anything lacking, anything wrong, to first find out if it was what they did not know or understand and we got more good out of that meeting by clearing up misapprehension on the part of the editors, by showing the man that the thing he had been criticising was actually done, was actually research or demonstration or regulatory work of some one of the branches, and I am sure that they went away from here feeling that the

Department really was functioning to a higher degree than they had any idea of. It seems to me it is important that the extension workers should do all in their power to further this attitude where they hear a criticism. One of the agricultural editors had an editorial in his paper just a few weeks ago that he could save \$5,000,000 a year by discharging from the Agricultural Department that useless lot of employees, those not really engaged in any kind of work. He did not know that nine thousand men and women in the Department of Agriculture had resigned their positions within the previous twelve months because they could not afford to continue work at the salaries they were receiving. When told that, he was sorry but a good deal of harm had already been done. If there ever is in extension work anybody who has a criticism or is finding fault, we must show that he is wrong or recognize the wrong and start remedying the fault and all of us working together correct that thing, that we may have the confidence and cooperation of those we are trying to help most in this great work of building a better agriculture.

I welcome you again to Washington and wish you to have no hesitancy whatever in suggesting where the work here can be strengthened, where there are places that work should be done that is not being done or any and every helpful suggestion you can make. If there are criticisms, justly too, and there must be in such a large organization, you are urged just as strongly to make them, not because of any interest that I personally may have in this work. I have only a lease for a few weeks. It is only that I have the same interest in this institution that you have and that interest is rendering the greatest possible service to agriculture.

CHAIRMAN: Now I take pleasure in presenting to you the Assistant Secretary of Agriculture, Dr. E. D. Ball.

DR. BALL: Dr. True, Ladies and Gentlemen. One day I conceived the idea that some of the arguments I was using and preparing to use before the committees in Congress would probably be stronger if I wrote them out and put them in the form of a statement, and since that time I have had a number of calls to use that material. I want to apologize in the first place, for the fact that it is not what it has been taken for--A complete National Policy--. I want you to keep in mind it is only some suggestions of a policy--though I am discussing a national policy.

You will remember that Dean Davenport two years ago gave us a very clear cut discussion of the need of a national policy in agriculture. Since that time a number of men have been handling the subject in one way or another. Senator Harding in his address at Minneapolis, I think, laid down the broadest and most comprehensive discussion of what the needs of agriculture are that has been so far promulgated. Since that time Dean Waters has come out with a statement of an agricultural policy as he sees it. I want to say that this is an agricultural policy as I see it, because I have tried to take the broader view, the national outlook, and that it involves a great deal more than agriculture. And so an agricultural policy will be only one phase of what I am going to discuss this morning.

The situation that calls for all this discussion is, briefly this: That the United States which has been going on unswervingly for a century, priding itself on its tremendous production of food and has

been wont to boast that it is the greatest agricultural producing nation in the world,--is rapidly approaching the time when her own population is going to use all that she produces and more. In other words, from being an exporting nation, we are rapidly approaching the time when we are going to become an importing nation.

The Bureau of Markets and Crop Estimates got out a little chart which I regret I haven't an enlarged copy of--but all my charts are small photostat charts that have been published--showing the relation of production of food to population in the United States and you may be able to see this black line on this chart, showing how from the end of the Civil War the increase in food production in the relation to population was a tremendously rapid one. Food increased much more rapidly than population until it reached a maximum in 1898 and since that time the United States has been gradually but very steadily going down hill with reference to food production as compared to population. Our food is not keeping up with our population increase. Even with the war drive it went down as rapidly as it had been going before. All our war activities did not stop it. We are losing in the competition of population against food production. To bring this home in concrete figures, just take the Wheat production in five-year periods, beginning with 1896-1900 it was 540 million bushels; from 1910 to 1914 it was 728 million bushels. The war drive put wheat away up but now wheat has gone back to 750 million bushels, practically to what it was before the war. Wheat kept up its increase with population up to 1914. But since that time, even with the war drive, our population has outstripped it and we are exporting less and less wheat. Wheat is human food as corn is animal food.

Corn is very much worse. Our highest average production was from 1906 to 1910, when it was 2,817,000,000 bushels. A five-year period since that time has never equaled it. We are not only not keeping up with our population but we are actually falling back in corn production in five-year averages. Then figure out that in fifteen years from now at the present rate we are going, you will see that we shall actually be importing the staple foods!

The situation measured in total exports and imports, of course, you know is worse than that. Today America is shipping in more food in dollars than she is shipping out. Of course, coffee, tea and spices, tropical fruits and sugars make up a large part of our imports. We have always imported them and always will, except sugar. The others we always will import. But of just those things which make up the primary food crops of the United States, the wheat, oats, barley, and corn, unless some drastic move is made, we are going to be a food importing nation inside of fifteen years.

Now, what does that mean? Turn to this chart here for a minute and see what it means. This chart was taken out of the American Encyclopedia and gives the population of all Europe from 1800 to 1900 and then someone has added the population for 1910 of all the nations of Europe and of the United States. Look at that chart and you will see that those countries are divided into two groups. The United States and Russia have all these years been food exporting nations to the rest of the world and these two countries have grown rapidly in population, while all other countries - that portion that has been the food importing nations of the world - have grown very slowly during that period. Some of these importing countries grew only 2 million in one hundred

years. The United States grew 100 million in a hundred years!

I have checked up on many of these countries and of all the other countries that we can check up on in population for 100 years and this seems to be the universal rule--that when a nation passes from a food exporting or a self-sustaining nation to a food importing condition, the growth of that nation very rapidly declines. It may or may not become stationary. It may go on with a slow rate of development but that development is not the development of the United States or Russia. Then the question comes, do we want to become a food importing nation? As farmers, for instance, do we want to become a food importing nation? If we become a food importing nation, the price of wheat in Chicago will be the price of wheat in Liverpool plus what it costs to move it from Liverpool to Chicago. The price of wheat in Chicago now is the price of wheat in Liverpool less what it costs to move it from Chicago to Liverpool. At first thought it would be of tremendous advantage to have us go over into the other condition, but when I have talked this to a farm organization they say "No, no." We realize that while that would be true on the face, yet immediately when you raise the cost of bread to all the workers of this country you would raise the cost of labor to every manufacturer in the country, you would raise the price of everything the farmer brought. You would simply raise the whole scale of living as we have seen it in the past few years and the farmer would likely come out the little end of the horn as he has come out at this time. No, it is of advantage for the farmer to be a part of a great nation that is growing and developing and is prosperous and happy.

If you will compare the status of the farmers of different countries of the world, you will find that those that are in the growing,

developing sections are far more prosperous and far happier than those of the other kind; so just from the farmer's side, the farmer wants to be a part of the greatest growing and most prosperous nation.

Now, let us drive this home a little bit more, because you may even yet question. This chart gives the crop production of all the states of the United States and is based on 1918 figures but the proportion is probably not very different today. The Atlantic and Gulf States represent very largely cotton and to some extent tobacco, not primarily foods, but raw materials. This group in the center represents foods, not only foods for humans, but the total food production which includes feed for animals, themselves in turn food for humans. So it really represents the total food production of the United States, animal and human. The first thing you want to notice in this region is that the settlement of the first two colonies was along the Atlantic Coast. We were not a food exporting nation when the first United States census was taken in 1790. There were less than 4 million people in the country 170 years after America was founded--170 years and less than four millions. After 200 years there were less than ten millions of people. We had not yet become to any extent a food exporting nation. Look at this chart and you will see that we started in 1800 with only a little over 5,000,000 people and did not get up to 10,000,000 people until 1820. After 1820 was when the population of the country began to move back on to the rich fertile lands of the middle west and we became capable of excess food production. From that time forward, when we commenced to be a food exporting nation, we have grown as no other nation in history has ever grown. New York has jumped in that hundred years from a small town to the largest city in the world. Chicago, on the wave of that growth, went, in fifty years, from the ashes of the fire of '71 to the fourth

city in the world today. Remarkable! There is nothing like it in all history. It took London from a time before Christ to come up to its present growth. Chicago has become a city of 3,000,000 in 50 years. It grew because Chicago is the eastern gateway of that great food producing area and Chicago will continue to grow just so long as she is the eastern gateway of an excess food producing area and the minute that Chicago or the United States stops being that excess food producer, everything that history has given us in regard to nations indicates that she will stop that growth. The question of whether Chicago--and when I say Chicago, I mean any other city in the United States--I mean the nation--the question of whether Chicago in the next hundred years is going to be a city of four million people or ten millions depends on whether this nation continues to be an excess food producer or goes back to the food importing condition of the old countries.

Now there is no question you must understand, but what we are going to become a food importing nation unless we do something about it, and it is going to take a united effort. It is going to take a serious, aggressive united policy with the backing of the whole American people behind it if we become anything else. Do we want to or do we not? When I talked this to the business interests of the country, the commercial interests of Chicago, St. Louis, Kansas City, I found very few of those men who seemed to understand. When I began to get further West, then they understood better. In Ohio they did not understand that in the next hundred years we cannot raise another large group of dots of production in the western area. When I tell them that the reason we have grown is because there have been continuously before the increasing population large areas of land to be taken up, rich and fertile lands to be settle, but that day has gone, that now practically all of the easily handled rich and fertile land of America is gone -- that

there will still be small areas in which the frost hazard is great, areas in which the drought hazard is great, areas in the far west that can be irrigated or drained at high expense, but areas in which the cost of production will be higher than it has been in that of the lands already taken up--when I tell them these things, they find it hard believe.

Now, if we are going to continue to keep our food production up to our population increase and keep that population going on as it is now, we are not going to do it by increasing dots out here in this western country because I believe I know its problems. I spent twenty years in the West and I have sympathy with its problems. I spent 16 years in Utah. If you tried to double the size of the dot in Utah you would expend more human energy and money than to double the size of the dot in Iowa. What would it mean? Nothing to the nation. It would to Utah. But doubling the size of the dot in Iowa would mean food enough to keep our nation growing and increasing for one hundred years. So that is the problem before us. We must very seriously redirect our efforts in agriculture.

Before I take that up, I want to show you another little chart, a chart which was startling to me and when I had mastered it, I found it very comforting. That is the path of world supremacy for 54 centuries beginning 34 centuries before Christ and ending at the present time, 20 centuries after Christ. If you look on that chart you will notice that for the first 15 centuries in which human history was written, world supremacy was down in countries in which the temperature was from 72 to 78 mean average temperature - a little higher than this room. Egypt, and Chaldea and those countries held the world supremacy through those centuries. Then steadily that civilization and world supremacy moved away until Rome held the world supremacy, it then fell temporarily and again went on up and up and has been steadily

moving away toward the colder regions. Civilization has furnished clothing, shelter and fire to enable man to withstand the rigor of cold climates - and probably something also--Scientists of the Department of Agriculture tell me that there is an unpublished law even greater than this and that is, that practically all food producing crops reach their maximum production near the northern limit of their adaptation. As civilization has adapted itself to colder and colder conditions, it has been gradually moving into areas in which greater food production was possible. If that is true, then there is going to come a day some time when we are going to reach that northern limit of adaptation. Now for the next century or two, if this chart is true, and I have tried to check it up with history, world supremacy is going to be fought out on this line between a 48° and 54° mean temperature. If I read correctly then the next century or two of world supremacy is going to be fought out along that line. The encouraging thought about that is, that I look away up here and see that Moscow and Petrograd like Winnipeg are too cold, too far north to be possible as world dominating influences in the next century or two. That does not say that in the centuries to follow world civilization is not going to center as far north as Russia, but it does indicate that in the next century at least the control of this world is going to be in a line with London, Paris and Berlin and Chicago and New York.

Now, the question is, does this nation look at the future regardless of war? Whether it is a military war or trade war, we are going to have war, we are going to have to fight for supremacy in the world unless the whole scheme of nature as we biologists understand it has been abrogated. All life is a struggle and all life always will be a struggle and survival is going to come, as it has always come in the past, to that nation which has fitted itself, - to that individual or race which has fitted itself to survive. It seems to me from the great biological standpoint that we do not

want to prepare for war, we do want to prepare for peace and that preparation for peace means that this nation wants to continue to grow and develop, because the world is going to increase in population. If that increase is not made in this country, it is going to be made in some other country; if world dominion is not centered in the United States, it is going to be centered in some other country and I want to go back^{just}/at this time and let you see this chart here and you will notice that Germany started below France back in 1800 and that she came out away above. What did that mean? It meant that Bismarck back in 1870 willed that the German nation should go on and develop and rule the world, and he saw clearly that if it was going to do so it must develop its scientific work; it must develop scientific research along all lines, not just alone agriculture, but in all lines. And so Germany spent \$5 to every other nation's \$1 per capita in subsidies of research. And the first thing they did was to take the dye industry away from England, then the steel industry away from England and later to steal everything else! Now if the American nation is going to keep on growing and developing, we must go back and look at that record and copy what Germany did -- with a very different motive in our minds! Dr. Vernon Kellogg, who was next to Herbert Hoover in relief work, spent months living with the German officers behind the German lines, and he said in a public speech here that every time the Allied armies had a success, every time a submarine was stopped, when they succeeded in conquering the poison gas, in meeting airplane attacks, in finding that long-range gun that was bombarding Paris, when they broke up the nights raids on London, the German officers would say "Just you wait, our scientists will find a way to conquer you yet!" It was never "Just you wait, our armies will conquer you." That was a wise man away back there who foresaw armies as a necessary instrument in warfare, but back of those armies a tremendously powerful scientific organization, and who built his plan for

world dominion with an army in the foreground and a scientific organization in the background with which to conquer the world. Not until the Allies mobilized their army of scientific men and put them to the problem did the allies overcome. We didn't whip the Germans by our armies, but we whipped them by the scientific discoveries which stopped their scientific attacks, met them, checked them, went them one better and were ready for even greater achievements at the time of the armistice.

The allied nations saw the value of the scientific work. England appropriated a million pounds, - five million dollars - an entirely new appropriation over and above anything that she had ever appropriated before - what for? For agricultural research - recognizing what had helped Germany to win and recognizing that in the future, England had to meet that proposition. Five million dollars of pure research funds--that is more money per capita than the United States is expending today. England has all this. We have two and one-half times her population and we spend approximately twelve millions for our entire agricultural research. England's appropriation, remember, is over and above her regular work--an entirely new appropriation added to what she ever had done before.

I was absolutely dumbfounded when I read that the budget of France to her Minister of Agriculture for last year, the one she is now working on, I could not believe it. I had to go back and read it all over. It is 148 million francs -- that is just \$1,000,000 less than we are spending in the United States for all our agricultural efforts! They have 40 millions of population to our 106 millions.

The commercial industries of America saw what the war did. They saw the benefit of organized science, of organized industry, and as a result they have been taking over more and more of our scientific men, organizing

research in their various lines, because they saw that the future means a very much greater competition than they have ever had in the past. They saw they had to meet a competition backed by scientific investigation.

If the American nation as a nation wants to compete with France, England, and Germany, she must recognize that as a nation we must take a different attitude and if we are going to prevent that change from an exporting to an importing nation 15 years from now, we must begin now to anticipate it. Because scientific research - agricultural research - is a proposition of a long time and today is none too soon to recognize the situation and to start at it. I think you are probably all familiar with Dr. Rosa's interpretation of the budget of the United States, in which he shows that out of the \$5,700,000,000 appropriated and expended last year in the United States, only one per cent was spent for research education and development of the nation; that 93 per cent were expended for wars, past and preparations for wars to come; that 6 per cent was all that was spent for running this government and one per cent was all that was put into investment! Dr. Rosa was generous with the Government in that statement, because he credited all of the 32 millions appropriated to the Department of Agriculture to research education and development, while out of these 32 million dollars, as a matter of fact, almost 20 million appropriated to the Department of Agriculture was used for regulatory work, the meat inspection, the pure food inspection, and things of that kind, which are regulatory and are very largely for the protection of the consumer and not the producer. So only 12 millions out of the Department of Agriculture's total appropriation really goes to help the producer.

As I figure it out, in last year's budget for every hundred dollars the United States expended, 30 cents went to development. That is what our permanent value is worth--just thirty cents! That is the investment

of this nation! When you compare putting ten and twelve million dollars into a battle ship--twelve million used to build a battle ship, but it wont do it any more, it takes 20 millions now - and at the end of ten years it goes to the bottom of the sea and has been a million or two of expense in the meantime--if you compare that 12 million dollars invested in the development of this country, increasing the area of production, increasing the production per acre, as a permanent investment that goes on and on forever, and is not sunk or sold for scrap at the end of ten or a dozen years, but goes on bringing a permanent return to the country--think what it would mean! Yet out of our whole budget the United States invests less than one per cent!

Now Congress realizes this and is planning to get on a more stable and rational basis. Unfortunately, in order to ^{do} that she feels that she must cut down in everything, so begins with appropriations to Agriculture! (laughter) Well, we have practically agreed to that cutting, provided that they would do three things, which are absolutely necessary in the opinion of the Department and in the opinion of the Executive Committee of the Land Grant Colleges, in order to put American agriculture on a basis on which it can develop in the future.

Before I discuss these three things, I want to discuss one which I find makes the strongest appeal to the business man. When I made the statement that the United States Government does not expend one dollar to help the farmer any more than it spends a dollar to help a carpenter or a blacksmith or a dentist, the business men gasped but, gentlemen, there isn't a farmer in the United States that wants to or is willing to be classed as a pauper receiving charity and yet the great mass of business men and some of the men up there on Capitol Hill seem to think that it is a charity to help the farmer. I tell them No! It is anything on earth except charity to the farmer. You leave the farmer alone and he will get all he wants to

eat and drink and all he needs to live on from his farm with a little bit over. Every bushel that you go out and help him to produce above what he would otherwise produce, you get; he doesn't. The farmer produces enough to live on and you get the surplus and the more you increase the surplus the more industry gets to live on. If the industry of America wants to go on and grow and develop, it can only go on and grow and develop on the surplus produced on the farms of America. I am surprised to have to say that, but it has to be driven home to the business of America that she gets nothing but the surplus out of the farmer's production.

You have got to drive home another thing, and that is that when the farmer produces a big surplus, he really gets less and the consumer gets more. It actually is an advantage sometimes to the farmer to produce less but it is always an advantage to the consumer to have him produce more. They are beginning to see this now and they will see still more clearly in the future that industrial growth depends on the surplus produced by the farmer. The managers of the great railroads of America are beginning to want to know now whether they should build 2, 4 or 6 tracks and it all depends on whether we increase in population or remain stable. The cities of America want to know what they are going to plan for the future. Every manufacturing concern, every factory, every industry wants to know whether the next 25 years is going to see a tremendous increase or a decrease in their industry. In Springfield, Massachusetts recently a man from the industries said that it cost \$2.42 more per week to hire a man in a mill or factory in New England than it did in the wheat producing regions around Chicago and that they were not going to be able to compete with their rivals in the West and therefore they were expending money to develop a great food production in New England. If it costs that much now and practically puts the New England manufacturer at a hazard, what will it do if that excess of food goes to India

or Russia or some other place? It will mean that the manufacturer instead of moving toward Chicago will move across the water in another direction. It means that the Chicago manufacturer will move to the seaboard, closer to the food. It will mean a great upheaval in our national life, a great reorganization or else it means that a great aggressive national policy of development must be inaugurated.

Now the three things that to my mind are necessary if the policy is going to be carried out are:

First: provision for a better organization of research in America, a co-ordination of all lines of research work. The Land Grant Colleges of America through their committees on agriculture are asking Congress for the appointment of a director of research to be contemporaneous with the director of research of the states and whose function it would be to bring the research of the federal government, of the Department of Agriculture, into harmony with the research of the states, and more than that--as there is year after year as much research going on outside of either state or national agencies as there is inside--to bring all of the research of this nation--that is to say, all the commercial, federal, and state supported research into one harmonious whole directed toward the building of a great nation. That is the first step.

Second: That if the federal department of Agriculture is ever going to carry out the great things that must be carried out, if we are going to double our agricultural production, we must be able to hold leaders in the field of Agriculture, and that means an increase in the salary standard. It means a larger increase in the maximum salary allowed and so we have asked Congress to raise the salary allowed to scientific men in the Department of Agriculture from \$4500 to \$6500. That is not even approaching the maximum of the endowed universities for their professors, heads of depart-

ments, not deans or presidents, mind you, just professors. The average salary paid to the project leaders of the Department of Agriculture today is \$3,481. The project leaders are men who handle great projects. Many of them handle more than the directors of experiment stations of America. Most of them handle more funds than an individual director of an experiment station. Their average salary is today \$3,481. That is less than a county agent in Illinois averages.

I just made a little calculation for these people here because I had heard it said on the Hill that the Department of Agriculture now was getting higher salaries than any other department - (laughter) Yes - it is amusing - I want to call your attention to the fact that there are more scientific men in the Department of Agriculture than in all other branches of the Government put together. The Department of Agriculture has 3,778 scientific men against 3,296 in all other departments. Practically 3,800 against 3,300. On a strictly technical basis by which we excluded all those not doing strictly technical work, the Department of Agriculture has 2,240 against 2,292 for all other departments. When it comes to the question of the average salary, I have a list of all the salaries over \$5,000 in the Government departments. In the Department of Agriculture are 9 bureau chiefs receiving \$5,000 and one receiving \$6,000 - ten men that receive \$5,000 or over. In the other departments of the Government I have found 380 who receive from \$5,000 to \$15,000 - 380 men in other departments against this Department's ten. And I did not include in that list the Army, Navy and Marine Corps, the Coast and Geodetic Survey, the Coast Guard and the Public Health Service which are now under one class of pay. Mind you, I am not objecting to the pay of any of these other men, but don't tell me that the men of the Department of Agriculture are getting more pay than in the other departments! (laughter)

General Pershing receives \$21,000.00 by special enactment; a General in the Army or an Admiral in the Navy gets \$15,500; a Lieutenant General or a Vice Admiral, \$10,600; a Major General in the Army or a Rear Admiral in the Navy, \$9,675; a Brigadier General or Rear Admiral \$7,500; a Colonel in the Army or a Captain in the Navy (I am giving you the Army and Navy correspondences in rank) gets \$6,330, - that is, after serving five years; after serving ten years he gets more, after 15 years still more, increasing from \$7,880 to \$10,000 according to service). A Lieutenant Colonel in the Army or a Lieutenant Commander in the Navy gets \$5,600; a Major in the Army or a Lieutenant in the Navy gets \$5,600; a Captain in the Army or Lieutenant in the Navy gets \$3,427.

Now, I want you to keep that figure in mind,--\$3,427 for a first Lieutenant in the Army or a Junior Lieutenant in the Navy--this \$3,427 against \$3,481 as the average salary of the Project Leaders of the Department of Agriculture--the men in charge of the great lines of Government activities, men on whom grave responsibilities rest. The success or failure of the Department's work rests very largely on these men. A second lieutenant in the Army or an Ensign in the Navy gets \$2,734, the average salary of the scientific workers in the Department of Agriculture is \$500 less than that of a second lieutenant, the lowest commissioned officer in the Army. That, gentlemen, is the schedule of salaries on which the Department of Agriculture is compelled to ask the scientists of America to come and work out the great food problems of this nation. If we are going to meet the still greater problems of the future, we must have still greater leadership than we have had in the past.

MR. E. G. MONTGOMERY, In Charge Foreign Markets, Bureau of Markets. "The World Market Situation" - - The Foreign Markets Section of the Bureau of Markets might be said to be the last and in some respects the least of the different sections of the Bureau of Markets. This section was organized about three or four years ago. The activities are along two main lines which might be designated as trade promotion, and as world market information service. In the beginning trade promotion was looked on as the principal activity of the Foreign Markets Service but gradually we have come to believe that the greatest service we can render to the farmers of the country will be to keep them informed as far as possible in regard to the world supply and demand for the principal agricultural commodities.

In regard to the trade promotion work I can cite two examples that indicate the type of trade promotion that has been undertaken. For a number of years there has been a steadily developing demand for pure-bred live stock in South America. This is a vast live stock region in about the same stage of development as our Missouri Valley was forty or fifty years ago. For a number of years our larger live stock breed associations have been looking to South America as a possible outlet for their surplus of pure-bred stock. In the past Great Britain has largely been furnishing pure-bred stock to South America, as she furnished the foundation stock for the United States in the past. After consulting with some of the breed

associations it was decided to send two men to South America in the summer of 1919 who made some preliminary investigations with special reference to a market for the beef breeds. In 1920 two other men were sent to South America to extend this investigation giving special attention to Brazil and also to look up the market, especially for hogs and dairy cattle. After their return a conference was held with the secretaries of about thirty breed associations in Chicago and plans are under way for direct cooperation with the breed associations in the sale of pure-bred live stock to South America. We are opening up this month an office in Buenos Aires with a permanent agent who will give his major attention for the next two years to promoting the sale of pure-bred live stock in cooperation with the breed associations. We believe that this type of trade promotion work where we can make direct contacts with organizations of producers in this country and assist them to find an outlet is the kind of trade promotion the Bureau of Markets can assist in.

As a second example we have given considerable attention to the export trade of fruit in cooperation with some of the fruit growing associations and fruit shippers. A survey was made of the possible outlet for marketing fruit in Australia and the Far East as an aid to the Pacific Coast shippers who expect to have a large surplus in the course of a few years. The result of these investigations has been published in two bulletins. We also located an agricultural trade commissioner in London who has given a large

part of his time to the study of the English apple market. Among other things he has investigated the method of marketing and furnished us reliable information on the condition of fruit arriving in England. The loss in transportation was so heavy that we decided to undertake an investigation. A man has been assigned to this work and will make trips with fruit cargoes from New York to London to study the causes of loss in transportation. The solution of the problem will probably be worked out through cooperation with the shippers in arranging with some one or more of the large shipping companies to give cargoes of apples proper storage and care in transportation. We have ample evidence that most of the loss can be avoided by proper handling on shipboard. This is the kind of trade promotion that is based on improved transportation that can be worked out in cooperation with the other branches of the Department of Agriculture concerned in these matters.

The world market news service, however, I look upon as the principal work to be developed in the next few years. About a year ago I saw a statement in one of the leading papers to the effect "that the farmer is entitled to as good information in regard to the world market for products as are the people engaged in marketing these commodities." As a rule the great grain handling houses and packing houses have facilities for keeping well informed on the world supply and demand. The producer, however, knows very little about this and his agricultural program is carried on in practical ignorance

as to what the world needs. This is not true of any other industry to the same degree. For example, the few great organizations engaged in the steel industry are able to judge at once when there is a decreased demand and reduce production accordingly. They are thus able to adjust production to consumption. During the past year we have seen the woolen mills in this country and throughout the world make a radical reduction in production in direct response to the decreased demand. However, we have seen the wool producers going right on producing the same quantity of wool. They had no advance information or opportunity to adjust production. Neither have they at this time any forecast of future demands two or three years hence. The only logical way in which we can work out an agricultural policy in this country based on the domestic and world demand for our commodities is to have some foreknowledge of what the world wants and adjust production to demand just as the great manufacturing industries such as the steel industry or the woolen industry are able to do. An agricultural policy based on blind continued maximum production with no regard to consumption is sure to keep agriculture in a chaotic and unsatisfactory state. This has been the history of the agricultural industry for centuries and the question arises as to whether there is not a better way to handle the situation.

In the United States Department of Agriculture we now have probably the most complete crop reporting system for the United States

that exists in the world. We also have available such crop information as is available from foreign countries. The International Institute at Rome is rendering a great service in collecting and printing this information. We believe, however, that a great deal must be done to make the information much more complete than it is at present and which is much more important, interpret this information in such a way that it will be a guide to our future agricultural policy. Our present plan contemplates placing a few expert observers at strategic points in the world to give us first hand observations. A few men should be placed in those countries that compete with us in production. No large business institution would go ahead blindly on production without watching carefully the progress of his competitors and especially ascertaining whether the competitor could produce at a lower cost. In a few of our agricultural staples such as grain and live stock we must compete with rapidly developing new regions such as Canada, South America, Australia and probably some time in the future with Siberia.

Also it is well recognized that price is probably more definitely related to demand than production. The one great market for the world for raw agricultural products is Europe. We should have in Europe at least two or three expert observers who could keep us informed on the probable future trend of demand for these commodities. These demands are based largely on industrial conditions

and trade conditions which determine the buying power of the European consumer. It may be of interest to review briefly two or three recent happenings.

For example, there was a sudden and unexpected drop in the wool price last May. This was directly based on world supply and demand. At least a year before it was known that there was a world surplus of wool especially of the lower grades. It was expected, however, that Central Europe on the resumption of peace would be able to consume this surplus as it is well known that they have received very little raw wool for several years and are very much in need. However, the expected demand did not develop from Central Europe as they are not able to pay for the goods. The result is that a large surplus accumulated of the medium and low grade wools. The world has dropped down considerably below pre-war consumption of wool due to the fact that Central Europe is not able to buy. Meantime wool production continues at about normal. The wool producers of the world should realize this situation. Either European demand must come back to normal or else our world production must be reduced to meet the conditions. The recovery of Europe is probably a long, slow process and the indications are that the normal consumption of wool will not return for many years. The same situation exists in cotton. Previous to the war the world consumed about 20,000,000 bales of cotton and the production about balanced consumption. However, for the past three years consumption has

dropped down to around 17,000,000 bales while production is now almost normal. Apparently world consumption is about 3,000,000 bales lower than pre-war. This again is due to the lack of buying power in Central Europe. The important question is then, has the world dropped to a lower consumptive basis and how long will this lower consumption continue? It is obvious that we cannot go on producing cotton in pre-war quantities if the world demand is two or three million bales below pre-war consumption. These two examples are sufficient to illustrate the necessity of a very thorough study of world-wide conditions in order to develop an agricultural policy of production based on world consumption. As pointed out before, agriculture is about the only great industry which in the past has not been able to readily adjust its production program to variations in world consumption. It is our hope that through the Foreign Market Service the Bureau of Markets may be able to furnish much more accurate information to the large farm organizations of this country as to what kind of agricultural program is needed in order to meet world conditions. With the rapid development of our farmers' cooperative organizations representing the different commodities such as fruit, grain and live stock, there will be an opportunity to get this information directly to the producers through the medium of these organizations. There should be close cooperation between the leaders of these organizations and the Bureau of Markets.

MR. CHESTER MORRILL, In Charge Warehousing, Bureau of Markets.

"Warehousing and Standardization." -- In considering work that looks forward to many of the things that farmers and those who feel that they are interested in farmers or who represent farmers feel they are concerned about, we try to work towards stabilization (we hear that expression frequently,--the stabilization of prices, the stabilization of Standards), the reduction of spreads between the price paid to the farmer and that paid by the consumer, to equitable distribution as a means of reducing spreads and accomplishing stabilization, and reduction of losses in the course of movement between the farmer and the consumer--all with the same purpose in view.

Taking up staple agricultural products, to which I will address myself primarily, you find that you will have to consider the storage and financing of farm products during the interval between the time when they leave the farm and ^{the} time when they are manufactured or go into the consumers' hands, and that involves the standardization of grades.

If you go into the subject of warehousing and financing of farm products, you find of necessity that you must consider the available storage places in the country, the suitability of that storage space, the service rendered by the people who operate the

warehouses, including the kinds of receipts they issue, the statements that may be made in those receipts, the use that may be made of those receipts by the owner of the products, by bankers and others who come in contact with them, and the relationship between the insurance companies, bonding companies and others and the warehouse people, and the depositors of goods in the warehouses.

The farmer, while he may not place agricultural products in warehouses to a very large extent in the case of certain commodities, cannot escape being vitally interested in what happens to those products after he places them in warehouses. And he is vitally interested because of the necessity--so far as forward looking work is concerned, of determining whether the more or less violent fluctuations may be eliminated.

We hear a great deal, in some commodities particularly, of what is known as the "autumnal dip" occasioned by heavy marketing by farmers and those who deal with farmers during the few months closely following the harvest time. It has been estimated, in the case of cotton, that 75% of the cotton crop leaves the hands of the farmers in 4 or 5 months. Obviously it is not consumed in those four or five months and equally obviously it is in existence somewhere in gradually reducing amounts throughout the twelve months. The place where it is during those twelve months is of the greatest importance from the stand of whether or not it will be safely stored and properly carried during that time, whether the insurance rate will be high or low, whether the interest rate will be high or low on loans made to secure the product, or whether the person who puts his commodity in that warehouse has gotten any profit or not.

In looking toward improvement, we should deal with the subject regardless of whether the farmer takes over the marketing process or leaves that in the hands of the middleman. If he takes over the marketing process of course he has exactly the same problem that the middlemen now have with reference to the storing and financing of his product, and whether or not he gains by the process isn't dependent solely upon the size of the payment that he now makes to the middleman for his services, because his financing and his warehousing may not be properly accomplished. The warehouseman and the banker perform the function--the one of carrying the product and the other, of financing it. The warehouseman must be one that can be relied upon to care for that product--not as if it were his own, but as he would do if it were his own and he were trying to avoid a loss on it. (I make what may seem to be a hair-splitting distinction. However, in some instances we have had in times past warehousemen who have taken the commodities of their customers for the temporary purpose of financing themselves, hoping to be able to replace those commodities later). It is necessary, in order to bring about the greatest return to the producer or a reduction in the cost of handling staple agricultural products, between the producer and the consumer, in addition to having a safe and suitable storing place, a reliable warehouseman and available storage space, that we have the ability to obtain from those warehousemen receipts which are clear in their terms, which impose a definite obligation upon the warehousemen and which carry in themselves some evidence of the reliability of the warehousemen, minimizing as far as possible the necessity for investigation by bankers and others who take those receipts.

Those receipts should contain in them definite descriptions of the articles received for storage. They should not be, as we so frequently see, so many packages said to contain wool, which will be delivered to the depositor or his order. That kind of a receipt isn't worth anything for banking purposes. As a matter of fact, I have talked to bankers time and again and they have said that when they followed that practice they were relying upon the borrower's honesty--the moral hazard--they did not look to the warehouse receipts as their security. They wouldn't lend money to a man if they didn't feel sure of him. The warehouse receipts were simply secondary.

We find, in connection with what may be stated upon the receipts that the practice has existed among cotton people at times, perhaps also among others, of putting up receipts with bankers as collateral security, simply calling for so many bales of cotton; and in the past a practice among bankers has been to assume that these receipts called for bales of 500 pounds each of middling cotton, "middling" being the average grade that is commonly used as a basis for commercial transactions. By a custom that has developed, the bankers permit the borrower to substitute receipts--in other words, in order to conduct his business, he is allowed to sell from time to time and in order to do that he is allowed to substitute receipts as well as to pay off his loan and then, someday, as happened in one place, when the borrower has gone broke, the bankers have found themselves with so many receipts, representing not the "middling" cotton but so many receipts of the very poorest grade that could be found in the country.

The same thing can happen with the insurance man; he has to rely on the statements of various persons who, of course, are interested and

to apply to that his common sense, his judgment, in determining what amounts should be paid by the insurance company. Obviously, the owner of the cotton stands a very great chance of loss in the final settlement in some cases; in other cases he may make money, but the receipt in itself is of no aid in determining the amount of settlement.

Now, in a condition which should exist, it should be possible for the producer of any farm product which is capable of being stored and for which there is not an immediate need by those who manufacture or consume it, to be able to place it in a warehouse which is reasonably safe, at least concerning which he is entitled to believe that it is a safe place to store his product and from the warehouseman of which he will get a receipt which he can take to the bank and use, not as secondary security but as primary security, the moral hazard being reduced to the minimum. In order to do that, the receipt should show a clear description of the goods, should show the grade, should show the condition, should show clearly whether it is insured or not insured and the extent to which it is insured. Those are things of primary importance. But even with these things, there is still something which can be done to enable him to get the maximum loan from the bankers, - and that is, bankers have found that unless someone else undertakes the work for them, they are not safe in lending money on warehouse receipts, unless they have some sort of inspection service available, the risk is too great; and where that inspection service has not been furnished by the Federal or a State Government, in many cases the bankers have undertaken it for themselves. The fact that in many cases there is no disinterested inspection of warehouses makes it very difficult to negotiate these receipts outside the locality where the warehouse is situated, as the ware-

houseman is not known to bankers in distant sections.

Now that condition is not so bad in normal times when bankers are glad to carry most loans they are asked for; but in times such as we have had recently and in times that we may see in the future and, in fact, such as we might like to see, the warehouse receipts should be capable of being sent all over the country.

In order that the grades stated on the receipts may serve their most important function, they must be uniform throughout the United States. They must be definite, they must show exactly what a person may expect to receive when he is told that a commodity is of a certain grade, especially when he does not have means of access to the commodity. Having such a system of grades, there must be market quotations so that the banker, the insurance man, and others interested in the commodity will have an index to the value of the commodity and not be compelled to rely upon a general knowledge of the market condition. At present, in some localities, the banker calls in members of the trade and asks them their opinion and they tell him that this commodity is selling around about so much. Now that is without reference to grade and the banker finds that he learns so little that he is not safe in lending more than the value of the very lowest grade of the commodity, or he is compelled to make inquiries himself. In one place where I have inquired into it, the bankers employ members of the particular trade interested to go and examine the product in the warehouse and make a report before the banks will lend money on it.

I think as you consider these various factors that you will naturally see that the greater the uncertainty as to the receipt, the market, the value of the commodity covered, the less that bankers will be willing to lend or the greater the interest rates they will exact, and there is

even the likelihood that they will be unwilling to lend at all, and that has happened. Naturally, bankers are not to be blamed for being unwilling to lend money on warehouse receipts issued by warehousemen in localities where they are not acquainted,--when such things happen as happened down in Georgia where a certain cotton man had issued receipts for a large amount of cotton supposed to be stored in his warehouse, and when that cotton man suddenly failed it was discovered that receipts had been issued for four thousand bales of cotton that were not in the warehouse! So it must be clear that there must be something subsequent to the determination that the warehouse is suitable as a storage place and the receipt is all right, and that something is disinterested supervision somewhere.

That brings me to a mention of the United States Warehouse Act and in connection with this should be considered the various laws of the states regulating more or less the warehousing of farm products. We have different types of laws in the different states. In North Carolina, for example, there is a law providing for the operation of cotton warehouses by the state under leases and back of that operation there has been established a very large fund by the State as a guaranty of the security of the warehouse receipt in that state. In other states the legislature has not proceeded so far. In some states they rely entirely upon supervision and do not inject the state into the business of warehousing. Then there are many states where the laws are mere formalities either in the way they are drawn or in the way that they are enforced. Now the states can do much to improve warehousing conditions and to make the warehouse receipts valuable for collateral purposes, and there is a wide field open to them. Some of the states are already opening up that field. For example, I understand a bill has just been introduced into the legislature of Oklahoma to bring about a greater

degree of supervision and control by the state over the warehouses.

There is a bill about to be introduced in Kansas, and in Texas, and other states are thinking about it. Now the United States Warehouse Act enables the Federal Government to co-operate with the states in bringing about an improvement of warehouse conditions and accomplishing the objects I have referred to. The United States Warehouse Act provides for the licensing of warehouse men who are found upon investigation to be reliable, honest business men, whose warehouses are suitable for the particular product, who are able and willing to give bond to secure the performance of their obligations, and who are willing to submit to a certain amount of inspection and supervision, and willing to comply in all respects with their state laws. The bond given by the warehousemen under the United States Warehouse Act expressly compels him to comply with the state laws first, and any voluntary obligation he may assume in addition.

The United States Warehouse Act has for its purpose the bringing about of uniformity among the warehouses which will comprise the system in the performance of their duties. Warehouse supervision by the state officials will go a long ways towards assuring people who deal with the warehouses that they are safe in doing so. But outside of the particular state where the warehouse officials who undertake that supervision and regulation, there is not the same certainty that may exist inside the state,--not because the state may not be fully doing its duty but because the people outside do not know it and the Warehouse Act enables the state and the warehouseman to give the people outside the state the assurance that all these things are being done.

As I said before, no one is compelled to go into the system and there ^{are} number of things which might influence a warehouse man into the system. He may take out a license because he gets additional bus-

iness, because he expects to attain a higher standing among the people with whom he deals. But even if that reason does not exist or is not warranted because he is already doing all the business that he can handle, there are still other things that may bring about his interest. The bankers may not be satisfied because they may want to give assurance to other bankers in other localities that his receipts are all right. The bankers may, --because of these conditions, refuse to lend money to depositors of goods or may not lend as much as the depositors would like. You may find either the banker or the depositor or both getting behind the warehouse man and compelling him to submit to some sort of supervision to enable them to get the most out of their paper.

The insurance companies enter into it as a factor. The insurance companies in the south who handle the insurance of cotton have agreed on a reduction in most of the states of 25% upon cotton stored in licensed warehouses. While we do not know that any such reduction has been allowed for other commodities, there is no reason why it should not be allowed, because the principle is exactly the same. It is the disinterested determination of the stability and responsibility of the warehouse man, the bond that he has given, the fact that he is required to comply with the laws and requirements of his community and the further fact that from time to time at irregular intervals of not less than four times a year, the Federal Inspector visits that warehouse and determines whether he has complied with the requirements. All of these things influence the warehouseman to be more careful about living up to his obligation. And while the Warehouse Act in practical working has not been in effect very long, we have not yet had a case which involved more than a minor irregularity, and there is no way of estimating the possibilities for good the United States Warehouse Act may have.

I mentioned a moment ago that the Warehouse Act is designed to bring about uniformity and to ^{be} an aid to the state. As a matter of fact, one section of the Act expressly requires the secretary of Agriculture to co-operate with state officials and in a separate section the Act provides for the issuance of licenses to the state officials. The State of North Carolina, by agreement with the Department of Agriculture has licensed all its state warehouses under the United States Warehouse Act. In the State of Georgia, an agreement with the State has resulted in a very great deal of activity on the part of the state itself in bringing warehouses into the system. One of the state officials has made a considerable campaign and has done a good many things to popularize the United States Warehouse Act. Aside from his activities which have been a most important factor in developing the Warehouse Act in Georgia there have been such things as the failure of the warehouse I spoke of awhile ago. Immediately following that failure representatives of the Georgia Bankers' Association had a meeting with our representative at Atlanta and we had an avalanche of applications after that.

Under the United States Warehouse Act, grades that have been formulated and established by the Department of Agriculture are required to be used in the receipts which are issued by the warehousemen and can only be omitted in case the depositor requests otherwise. Insurance, if agreed upon by the warehouse man, must be taken out by him, and he is liable for his failure to do so in case he agreed to take it out. And there are a number of other obligations which he assumes, which go into the details of the matter, and which I will not discuss here but which the Bureau of Markets would be glad to discuss with you at any time either.

by correspondence or orally, such for example, as the requirement that any liens claimed by the warehouseman be stated on the receipt; and for example, that any claim of ownership of the product by the warehouseman be stated on the receipt.

Whenever farmers form co-operative associations they make it possible to a much greater degree to obtain the direct benefits of the Warehouse Act, benefits that they can see, but the benefits go to the farmer in some measure even though the farmer himself does not use the warehouse act facilities. The trade who handle his product, store it, finance it, insure it, are likely to be much more willing to deal with the farmer if they have the assurance of safe storage and the maximum of financial advantage in handling the product.

When the farmers organize into co-operative associations, they are confronted with the problem whether they will market the product and leave the storage to middlemen, or whether they will enter into the storage field themselves, and in that case they will find that all these things that I have mentioned are things that they will need to consider. Most of the banks have established the practice of not accepting as security from the person to whom they lend money receipts issued by him for products owned by him.

For example, the National Wool Warehouse & Storage Co. of Chicago came into the Warehouse system last July and in doing so arranged with their bankers and their attorneys to form a separate corporation--the Holliday Wool Storage Company which issues the receipts for banking purposes so that the receipt itself does not show ownership by the warehouseman as the same person who is seeking the loan. If the Association did not do that, it might find it necessary to do as was done by the South-

eastern Missouri Co-operative Sunflowers' Association, who took out the receipts in the name of the grower and then used the receipts for banking purposes.

I think probably I have covered the essential features of the Warehouse Act and the relations that may be expected to follow between the Warehouse and the state authorities, and the points where benefits are likely to accrue.

Mr. Montgomery:- I think, Mr. Morrill, they might like to know how many commodities the Warehouse Act is likely to cover.

MR. MORRILL. The Warehouse Act now covers cotton, grain, flaxseed, wool and tobacco. Regulations are now in effect on all those commodities. Cotton we had first, then we followed that by grain, and then by wool, and then by tobacco. In that connection, we have a problem relating to tobacco--I should like to take a little more time than was allotted to me because Mr. Tenny of the Bureau of Markets will follow me and he will have until 3:30--

(Cries of "Go on")

Mr. Morrill:- We have not now any generally accepted commercial standards for tobacco and the problem is a serious one for working out those standards, because until such standards are worked out market quotations are of necessity uncertain. You cannot tell outside of the locality in which they are used just what they mean because you do not know to what they apply. And it has been contended by a good many people who know tobacco more than they do other products that standardization of grade for tobacco is an impossible thing. The Federal Trade Commission recently in its investigations of market price conditions found that it could get very little out of the subject because of the absence of uni-

form grades. Different tobacco dealers have their own grades which may be known to others or may not. In some cases--and not isolated cases--it seems to me that the tobacco farmer is the most imposed upon person that I know of. He takes his tobacco in loose leaf form to a warehouse where it is sold at auction to buyers with whom he doesn't come in contact, who use a private grading system of their own and who bid the price to a point where one of them takes it--I don't see where the farmer gets in at all under those conditions. Perhaps I am overstating the tobacco condition, but that is my impression. The Federal Trade Commission having made its investigation recommended that the Federal Government establish standards for tobacco under the U. S. Warehouse Act and we have taken up that subject and in discussing it with people who are interest in tobacco from various standpoints and who are familiar with its peculiarities we find that there is a rapidly developing spirit looking toward the accomplishment of that work.

For instance, in Connecticut we are told they are proceeding to make arrangements by which they will largely finance any investigational work that we undertake in that section. The Bureau of Markets has very little money to spend for that purpose and it is anxious to achieve this end, and the only way to accomplish it is by co-operation. The Bureau of Markets will undertake to do what it can with what little it has to the working out of such grades, provided the states can take the bulk of such work and help to bring about a uniform result under a single direction.

Are there any other question you would like to ask? We have a little time still left because of the absence of Mr. Livingston.

QUESTION: How long is it going to take to work out these grades?

MR. MORRILL:- Well, you can see the idea, when you take into consideration the fact that as the work hasn't been done to any extent heretofore, it is going to take both skill and time to work it out, to work out any system of grades. A certain amount of investigational work must be done, over one crop at least, before you can look for a preliminary set of grades--a set that would serve as a concrete basis for tentative use, and I imagine that you could not expect a set of grades that would be reasonably exact--reasonably satisfactory in less than three years.

QUESTION: What good would the Warehouse Act be until you bring this about for tobacco?

MR. MORRILL:- The Warehouse System would not attain its maximum efficiency as to tobacco without grades, but it would nevertheless have the value of assuring everyone who deals in tobacco that the warehouseman is reliable, that the warehouse receipt means what it says, and that the tobacco when it is called for will be there--and that assurance alone is invaluable--why it is of the highest importance to bankers that they have the assurance that the commodity will be there when called for!

QUESTION: Would it be impossible to work out these tobacco grades by regions?

MR. MORRILL:- Of course the same grades cannot apply to all types of tobacco--they would have to work out grades which would have application to different types of tobacco according to each section of the country. For instance, where similar tobacco grows in Tennessee and also Kentucky, each state could not work this out separately--the two states would have to get together.

There is no reason, as I said awhile ago, why the states could

could not work this out, but if one state alone were to go at it by itself it might proceed along lines that were different from other states and along lines that might be inconsistent with the general scheme of grades, and there should be a common working together of all the states interested all over the United States, so that in the end the scheme would be the best that could be devised.

QUESTION: Is speculation in tobacco injurious to its marketing value?

MR. MORRILL: Is speculation in tobacco injurious to its marketing value? Well, of course, the buying of tobacco is in the hands of a few, relatively very few persons. We have no "future" market for tobacco and those different concerns know exactly,--or nearly exactly what they can use and when they can use it, and that information is largely confined to themselves. I see no reason why they cannot accomplish a good deal that would probably be accomplished by what you would call "speculation."

MR. MORRILL:- (Answering a question asked by a member) I will give you as an illustration, North Carolina. There are now about thirty warehouses, cotton warehouses, leased by the state. The state warehouse superintendent gave us a bond of \$50,000, which covers all the warehouses that are doing business in the State system. Now the question has been raised whether the bond is any security? As a matter of fact, no bond which would be less than the value of all the commodities in the warehouses would be complete security, but that would not be practicable and you could not do business with this kind of a bond. So the real purpose of the bond is simply an assurance--not that loss will be absolutely impossible, but that everything has been done that is possible to prevent that loss. As a matter of fact, the mere giving of a bond by a warehouse man causes him to be very, very careful,- for he doesn't want to get into any trouble.

QUESTION: Is Insurance carried on individual accounts?

MR. MORRILL: Insurance may be carried either by the depositor himself on his individual products, or by the warehousemen for individual accounts, or by blanket policies covering all the commodities in the warehouse. In some instances--warehouse men in the south, for example, have shown by actual figures that on cotton they saved all of the expense of becoming members of the warehouse system, by the reduction in insurance rates, and then got the benefit of the additional business they gained in the community, plus the advantage which the depositors got through their increased borrowing power. We happen to know of a certain case where the warehouse man was licensed and issued receipts which were readily accepted by the local banks at the ruling rate of interest, while the receipts of another not licensed were not accepted because there wasn't enough money available to lend on both.

QUESTION: In the case of terminals owned by railroads, such as in Baltimore City, what effect would that have?

MR. MORRILL: The Warehouse Act was intended to be of benefit to the producers primarily, and it was the purpose of the Warehouse Act to make it possible for the producers to have a safe storage place; therefore, the Warehouse Act requires that the warehouse man receive without discrimination to the extent of his capacity.

QUESTION: These are public warehouses.

MR. MORRILL: If they are public warehouses, then there isn't any reason why they should not come under the Warehouse Act, but they must be willing to receive without discrimination.

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CHAIRMAN: Mr L. S. Tenny of the Bureau of Markets ~~will~~ now address you on the subject of Cooperation.

MR. TENNY: I don't know who is responsible for the subject that has been assigned to me today. If it was the Chief of my Bureau, then I am convinced that the cooperation consisted in my having to cooperate with him by using part of his time and perhaps part of his ideas. I regret exceedingly that Mr. Livingston is ill today and unable to be present and deliver his address to you. I am not going to talk very much to you about cooperative marketing, which is the subject that comes foremost to our mind when we mention cooperation. It is with the larger phases of cooperation that I desire to spend my time for a little while this afternoon.

It is surprising how little attention has been given to the subject of marketing in this nation. It was only a few years ago that the Federal Government, or any of the states, made any real appropriation for the studying of marketing questions. Very little was done before the war, and with the coming of the World War, great problems of marketing and distribution were thrust upon us. The pressure for this study of marketing work came largely from the farm people themselves. For a half century questions of production had been studied, and large sums of money expended in extension work on these subjects pertaining to the production of more agricultural crops. All at once we woke up to a realization that perhaps we had produced sufficient, or at least we had produced all that could be marketed at a figure to assure the farmer even the cost of production. It was a pressure of these marketing problems that forced the farm people to emphasize the need of studying the problems relating to marketing.

Unfortunately, our farm people were perhaps over-enthusiastic as to what could be expected through the establishment of a National Bureau of Markets, and a few state bureaus. They thought that in the course of a few years, perhaps, after such bureaus were established, the marketing problems would be solved. It is possibly true that this attitude on the part of our country people had a great deal to do in making some of our marketing work rather superficial and unsound. The situation was complicated very much by the fact that this marketing investigational work had only just started when the World War came on, and it was necessary for us to give much attention to the distribution of farm products in order to meet a critical situation. In other words, it was not possible for us to study fundamentals at that time, we had to feed the world under very peculiar and extraordinary conditions.

But now the war is over, at least we hope so, and we are attempting to settle down to a realization that there are some fundamental principles in marketing. We believe that it has been the idea in the Bureau of Markets from the first, that these investigational lines should be undertaken, and I have only to call to your attention this booklet, a copy of which was sent each of you last summer, to remind you that the scope of the work of this Bureau is broad and fundamental. This book was prepared at the time the agricultural editors were present in Washington and were entertained by our Secretary. We do not feel that many of the subjects covered have been completed, and the work must be carried on yet for years to come, but one thing is very clear, and that is that a great mass of information has been made available through the study of workers in the Bureau of Markets. It was Mr. Livingston's idea if he had been present at this meeting, to develop

at considerable length, the broad scope of the work of the Bureau, and to point out to you that many subjects were now in shape so that they could be presented to the farm people of the country through the extension forces working in the forty-eight states.

I want to call your attention to this fact, that of the appropriations for the Bureau of Markets, which consist of something like \$2,500,000, only \$700,000 is appropriated by Congress for anything that pertains to work of an investigational character. \$700,000 out of \$2,500,000. Approximately \$900,000 goes to what we call service work; the remaining part, practically \$1,000,000 is for regulatory work, including the warehouse Act, of which Mr. Morrill has been telling you.

We are to spend a little time this afternoon in a more or less informal way in looking over some phases of the work of the Bureau which are ready for extension work. The Bureau in the past has never been in a position to really present to the extension forces of the country in a clear-cut, concise way, what has been completed in the investigational lines, and is therefore ready for the extension forces. We have prepared, in order to help you, an outline, and if some of you gentlemen will kindly pass these around, seeing that each Extension Director has a copy, it will assist us and will give to each of you something to which you can refer, both now in connection with my talk and later on for future reference. Let me call your attention to the cover, this is an outline of the market extension work. It is not an outline of extension, that is it does not pretend to give you a full outline of the individual subjects that we believe are ready for extension. It is rather just a picture of the broad field of marketing as

we see it that is ready now for extension work from the Federal Bureau of Markets. Later on, I hope it will be possible for us to supplement this outline with a working outline covering each one of the subjects mentioned herein. My talk is going to be very informal, and I trust that you will all ask any questions as we go along. If you will turn now to the table of contents, you will see that we have 10 pages at first that are devoted to the study of fundamentals. These subjects are not confined to the commodity groups, but cover the broad scope of activities that cover one or more, or perhaps all of the commodity groups beginning with page 11 and continuing through the remainder of the booklet. The subjects are arranged primarily along the commodity lines. We have attempted to arrange this in such a way that if a state is interested in any special group of commodities, it can be seen at a glance what work has been done by the Bureau that is now ready for extension. For instance, under cotton, one can see at a glance that we have covered practically the whole field of standardization, financing, and warehousing, market inspection, market information, and the world markets on cotton.

Referring now to the first group of subjects, you will see that on page 1 we have covered "Organization the First Step." If you will turn to page 1, you will see how this subject has been treated. We have not attempted here to outline a project for you for extension work on organization, we have not even touched the fundamentals of successful organization among farmers. We do point out that organization is the key which is opening the door to future prosperity to agricultural industry.

In paragraph three, we mention the fact that "the responsibility for teaching the fundamental principles of organization to the people of the rural sections, rests heavily upon the agricultural colleges and

schools located throughout the country. The farmer is entitled to all available information relative to the marketing economies to be obtained by collective action in the matter of standardizing products, assembling them for shipment, acquiring the latest market information, employing skilled salesmen, and using the collective credit of the farmers for financing the various marketing operations." This is a very big subject, and the Bureau of Markets has much information and much valuable material, such as moving pictures, charts, etc. that are available for states in carrying on this educational work in organizing the farmers. Some people unfortunately have the idea that in every instance the farmer should be organized, and they do not hesitate to go out anywhere and help establish a cooperative organization. We believe that there are cases where this is a very questionable practice, and that there are many communities and groups of farmers that are not yet ready for cooperative selling organizations. The Bureau has made a study of hundreds and thousands of organizations established in the past, and we have attempted to analyze the successful ones to determine what principles were fundamental in making them a success, and also in studying those that were failures to find out as far as possible, the causes for their failures. This information in a very broad sense, is available for the states in so far as they care to make use of it.

Page 2 covers the broad subject of the standardization of farm products. "The establishment of national standards for farm products is fundamental to improvements in marketing. Without established uniform standards there is no recognized basis for buying and selling, no common language understood by contracting parties. No standard of quality upon which values may be fixed." Skipping now to paragraph 3

we point out that mandatory standards have been adopted for American Upland Cotton, including grade, color, and length of staple; for shelled corn, wheat, and oats, and for Climax baskets and containers for small fruit, berries and vegetables. The losses that come from a lack of standardization, including the standardization of the construction of the container, run into sums of money that are almost beyond belief. The Bureau has done much in making charts, exhibits, moving pictures, and other things, as well as in issuing bulletins to present in a broad way, the fundamentals of standardization work on farm products. We believe that this line of work should be presented to the farmers personally, or through farm organizations until there is a feeling everywhere among our farm people that we must do more in America to standardize our farm products and the methods of shipping them.

Page 3 covers market inspection work. This is a line of work that has been very valuable to the shippers of our country. Our markets in the main are a long way from the shipping points, and the shipper in most instances, cannot see his produce when it arrives upon the market. There has been a great demand on the part of shippers everywhere for this market inspection work. We have pointed out that the buyer and seller are not in personal contact and that in the majority of cases, the buyer has not actually seen the produce when he buys it from the shipper. There is therefore, always an opportunity for dissatisfaction on the part of the receiver when the delivery is made. It seems to us very important that a full understanding of this market inspection work be extended throughout all of the states.

Page 4 covers market information. As we have pointed out in the first paragraph the less that the market news partakes of a nature of hearsay, and the more specific, unbiased and reliable it becomes, the less waste and dissatisfaction occurs in the marketing of the farm products. There is a constantly increasing demand for market information from producers, shippers, organizations, county agents, etc. To meet this demand is one of the major functions of the Bureau of Markets. You probably all receive The Market Reporter, which is a 16-page printed weekly containing valuable market reviews, and other information that is of importance in our agricultural marketing work.

Page 5 touches upon the world markets, but it is not necessary for me to spend any time on this subject as Professor Montgomery has already covered this subject very fully at the morning session.

A great many farmers' organizations have gone on the rocks because they did not have the right financial systems or their bookkeeping was not done properly. On page 6 we are giving you a very brief reference to accounting systems for cooperative associations, and are pointing out that the Bureau has ready for extension work a fund of information which is invaluable and which we are only too glad to make available to our extension forces in case they may desire to use it.

The losses that come in shipping perishables has already been touched upon, but the Bureau has a division that is making a very careful investigation of the methods of packing and shipping with an idea of overcoming a great deal of these losses on perishable fruits and vegetables, both in transit and in storage. The California Fruit Growers Exchange, which represents an industry fully organized, appreciates the value of this work, and does a great deal of extension work of its own,

making use of the machinery available here in the Bureau. We are ready to cooperate with other industries in extension work to help eliminate these heavy losses that occur.

Page 8 covers the transportation service. The marketing of farm produce in this country is so very closely tied up with the great transportation systems of the country, that it would be very evident that in trying to solve a few of the marketing problems, it would be necessary to maintain a Transportation Division. We must depend upon the railroads for much of our information regarding the movement of produce. It is possible for us in cooperation with the railroads, to help in the distribution of cars. Our Transportation Division is at the service of the Extension forces in so far as we are able to make it available. It is not the purpose of this Division to investigate rates as another branch of the Governmental service has been established for this specific purpose.

If you will now turn to page 9 you will see something that perhaps will appeal to you, especially. The Bureau maintains quite a large number of exhibits occupying perhaps 800 to 1000 feet of floor space, which have been established primarily, perhaps, for use at state fairs. These exhibits, however, are available at other seasons of the year, and at a very little expense on the part of any state. It can probably be arranged so that these exhibits could be used for farmers' week, horticultural farmers' organization meetings, or wherever in the state you felt that they could be of service to you.

The remainder of the booklet covers, as I have pointed out already, the commodity groups divided into the different activity lines

which are indicated at the top of the chart at the bottom of the first page. We have arranged this in this form so that if in your extension work you are interested in a certain commodity, you may see at a glance just what is available for extension work in the Bureau of Markets, but we have also made it possible for your extension people to see at a glance just what is being done in standardization work and to know what commodities are now being standardized through the work of the Federal Bureau of Markets. Looking at the second vertical column, you can see at once just what commodities can come under the warehouse work. I will not go into more detail regarding the outline as presented in this booklet. It is a brief outline at the best and we are simply asking you to take this home and use it as you have opportunity.

The practical question as I see it is this. This information is available for extension. We believe that it is fundamental, we believe that the principles worked out here should be put in practice in our agricultural communities. The Bureau of Markets, however, has very little money for extension work, and how are we going to get these marketing problems presented to our farm people back in the 48 states in the right way? The answer to that question seems to me is right here in this room. You men who are at the head of the great extension forces in the various states, must hitch your machinery up to this machinery that we have here, and so make it possible for this information to be distributed where it will do the most good. I believe that I will be safe in saying that Mr. Livingston feels that we have no desire, that we have no idea of building up a large extension service to carry this information back to the farmers ourselves. We must depend upon you men and

your organizations for this line of work. We believe that in working out these big national problems, we can get a view of a national marketing plan and that it is very essential that this marketing work be carried out along lines that are fundamentally correct. I would like to point out one illustration to show how a man back in one of the wheat growing sections of our country was in close enough touch with the national marketing plan and had enough market and world information so that he was able to give what I consider good advice. He was attending a meeting where 300 wheat growers had come together for the purpose of forming a "holding" organization to hold their wheat for a \$3.00 price. This meeting was not so long ago, and this man with the broad view saw that any such movement on the part of these wheat growers probably spelled defeat, and so instead of encouraging them to do what they wanted to do and what they had come together with a fixed determination to do, he pointed out the dangers of such procedure and instead of doing what they had planned, the group of farmers finally banded themselves together and agreed that in their various counties they would get not less than ten farmers to cooperate with their county agents for the purpose of planning a cost-accounting system on the production of their next year's wheat crop. This illustration points out also that problems of marketing cannot be confined to the state lines. It is therefore apparent that the state cannot solve its marketing problems alone. It is equally apparent that the Bureau of Markets will not solve all these problems alone. If they are to be worked out by any public agency, it must be done through cooperation. If we can get the Federal machinery cooperating fully with the state machinery, there will be some hope of our solving some of these difficult problems in

marketing. To that end I desire to make this suggestion which comes from the Chief of our Bureau, and that is that you men here representing the extension work in the states, get together with the Bureau of Markets and work out a definite plan that will meet the needs of the people in the states. We have been talking a great deal, we feel now that it is time to get down to real work, to "play ball" as it were, and let us "go to bat" and try not to "hit a foul," but "drive home a good home run." If you will appoint a good committee to work with our Bureau, we believe that in the next few months we can work out some of these fundamental problems, the solution of which is going to be of vital importance, not only to the individual states, but to the entire country. Will you not therefore, see to it that such a committee is appointed before your meeting adjourns.

I thank you.

QUESTION. - What are you going to do with the problems that the farmers bring to you for solution? I mean, especially the cooperative organization work?

MR. TENNY - I should at least point out to them the advantages of organizing in a way that is fundamentally sound. I think that every state should have a man who is familiar with the fundamentals of farmers' organizations, both successes and failures. These fundamental principles should be presented to the farmers by somebody who is very familiar with the work.

MR. TENNY - Well, personally, I would rather buy gas to do that than scrap a valuable car a little later for skidding.

QUESTION - On page 8, Mr. Tenny, under transportation service and the help the Bureau can offer under that head, is there ever relief along that line, really? Is there anything that can be done?

MR. TENNY - The transportation problem is a most difficult one. The bureau of Markets is hoping to study transportation by water and by auto. We believe that a broad study of these subjects will assist in solving the transportation problems on farm products.

QUESTION - Does the Interstate Commerce Commission depend upon you furnishing certain information?

MR. TENNY - Mr. Morrill, can you tell us about that?

MR. MORRILL - The Interstate Commerce Commission does not depend upon us to get a great deal of information, but we obtain a good deal through cooperation with the Interstate Commerce Commission, but as Mr. Tenny stated, our work in the Transportation Division so far has been of a service nature primarily. There are times when a certain section finds they are in need of cars and are not getting them fast enough. We have various contacts which facilitate their getting cars, and we help them to that extent. Sometimes certain sections cannot understand the reason for an embargo in a certain place. Our Transportation Division finds that out and gets the information. These lines of work deal primarily with the needs of the people to get their produce to market with all expedition, and through cooperation with the Interstate Commerce Commission and the Railroad Administration, we are able to render service through this branch of our Bureau.

MR. TENNY - Are there any other questions?

QUESTION - How hard is it Mr. Tenny, to get changes in regard to your regulatory rules?

MR. TENNY - Mr. Morrill will answer.

MR MORRILL $\frac{3}{4}$ That depends upon whether the change is a justifiable one. In case of the standardization of grades for grains in the United States warehouse, a change could not be made effective except under 90 days' notice. In the case of Cotton futures, the standards cannot be changed except upon a year's notice in order for it to take effect. Other forms that we have sent out can be changed at any time without notice, but of course, we would not put out what would not be desirable. People make contracts according to grades now in use, and they must have some opportunity to readjust their business. It is not much use to make a change in standards for every season, because we cannot find out what changes will occur until the season is half over. Therefore, your standards have to be - not inflexible, but of a permanent nature. They should be subject to as little change as it is possible to get along with in order for business to be conducted along safe and sane lines.

DR. H. C. TAYLOR, Chief, Office of Farm Management and Farm

Economics. "Adjustment in Farm Management to Meet the Marketing Situation."-- The topic which I have been asked to discuss this afternoon - Farm Management in Its Relation to the Marketing Problem - suggests this, which closely fits onto the division of Marketing brought forward by the last speaker, and that is that the market problem is in a large measure solved if the right things of the right quality have been produced. In other words, if the farmer has had his eye upon the market while planning his production so that the things he produces fit into the market situation, the solution of the marketing problem is half won. As the farmer today is thinking for the coming season, planning his farming operations, deciding what he will produce of each of his crops and how much he will produce of each of his crops, what lines of live stock he will maintain, whether he is going to get more stock and feed out the feed he has on hand, or carry part of it over for the next year, - it is the market he must have in mind, and, as we all know, the market situation today is not a clear one. Whether it is going to clarify before the farmer has to put in his crops this year is a question I can not answer, but this much we must continually bear in mind, that if we take inventory of the farmers' situation today, we find that the farmers of the country have the land they had before the War: in a measure they have the equipment; some farmers are better equipped, others not so well. When we look at the farm labor situation, there is ground now for hope that by spring there will be as much labor available for agriculture as there was before the War. If, then, when we have the whole agricultural inventory we find everything there that was there before the War, the question arises - Why any different plans now than before? If we must plan differently, it is because of a change in the marketing conditions. Shall we make a permanent change in our farm management plans because of a change that has taken place in the condi-

tions of marketing or the price situation? This depends upon whether the change is permanent or temporary-- if temporary, a temporary change; if permanent a permanent change.

The whole problem needs to be viewed broadly and logically in order to get a clear grasp of the situation. Whether or not the English market-- the European market-- has temporarily collapsed and is coming back is a question that many people are uncertain about today. If it has collapsed and is coming back soon, then the farmer needs primarily to look to a period of retrenchment expecting that the demands from abroad will be essentially as they were before. If, however, European agriculture generally is looking toward the production themselves of the things they formerly bought from us, this will mean a considerable readjustment of our agriculture. If we are to look primarily at the present to retrench-- that is, keeping down costs during this period of uncertainty as to what our market is going to be, then I think a number of things occur to you at once that can be done in the way of reducing expenses. If I were simply going to list them, I would go over the whole farm inventory, the machinery, the labor, the land, the other equipment, and see how it is possible to cut down expenses for the coming year. The machinery question is one of postponing buying now, so far as possible, with the hope that machinery will be cheaper. If one at the present time buys machinery at high prices, expecting to use it through a series of years and the price comes down, the man who has been forced to buy during the period of high prices has that extra charge laid up against his production for the years to come.

On the other hand, take the subject of labor. Farm wages have been very high-- not any higher I guess, when milk, wheat, and corn were high, than the prices of products-- but now that the products have gone

down the problem is that of getting the wages to correspond, and as spring comes on, one suggestion that has occurred to some people is that of a sliding scale wage based upon the price of the major product of the farm, whether it is cotton or wheat or milk.

In some states there has been a tendency for tenants to want to pay cash rent during the War. When prices were high, it was very profitable. This last season some farmers have found themselves in a position where they could not possibly pay the rent out of the proceeds of the farm because of the fall in prices. In a case of that kind, the suggestion is made of looking towards share tenancy, rather than a cash tenancy, or a fixed amount of product instead of paying the cash rental, so that the owner of the land will take a chance on whatever the product may be.

There may be various suggestions made along this general line.

Another main line of suggestion that might be taken up is that of producing more for home consumption and in that way cutting down the cost of living. Another line of suggestion is that if this period is not to result in a back-step in the higher standard of life that we are so much interested in, that the farmers must give more attention during this period of retrenchment to those things that affect the standard of living without an outlay in cash. The beautifying of the surroundings of the home and the improvement of the social life of the community.

These are roughly outlined suggestions that have been made as a means of retrenchment at this time when the world marketing situation is so uncertain. The main points that I wish to make regarding them you will find in the latter part of the mimeographed sheet.

I wish to make a general statement that I have worked out carefully and wish to read to you, with regard to this whole problem, and I think you have seen from the beginning of the program this morning on

Marketing, and will see until the end of the Farm Management program, that we are all dealing with one question, the economic problem of the farm, which commences with the adjustment of the farm to the market on the one hand and the adjusting of the whole marketing organization to what the farmers are producing on the other. In other words, it is one of the problems that intermixes so much that it is difficult to keep it entirely apart and I think we understand each other and have not tried very hard to keep it entirely separate.

The present agricultural depression is not without precedent. War periods have long been known to be periods of inflation, and have always been followed sooner or later by periods of depression.

In the latter part of the Eighteenth Century England was an agricultural country, and her farmers produced nearly all the agricultural products consumed in that country. The Napoleonic Wars, 1793-1815, were for British land owners and farmers a time of great prosperity. Rents increased greatly; men of intelligence, enterprise and money, were attracted to the land; long leases were made; land rose in value and was eagerly bought at high prices by farmers. The speculator and land jobber also came into the market. But the twenty years that followed the end of the war were a period of hardships to the land owners and farmers. The high rents and long leases became very burdensome to renters, and the promise of "Peace and Plenty" proved a delusion so far as the farmers were concerned.

The Civil War Period

Our farmers had the same round of experiences in the time of the Civil War and after. Someone writing in 1864 pointed out that "There must be something radically wrong with the farmer that does not free himself from debt.

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The figure consists of two separate line graphs, labeled (a) and (b). Both graphs plot 'Rate of reaction' on the y-axis against 'Temperature' on the x-axis. Graph (a) shows a curve that starts at a low rate at low temperatures and rises very steeply as temperature increases, indicating a high activation energy. Graph (b) shows a similar curve but with a much more gradual increase in the rate of reaction as temperature rises, indicating a lower activation energy.

Never in the lifetime of the present generation will such another opportunity present itself." A land boom followed. In Orleans County, New York, it was said that farms changed hands at higher prices than had ever before been paid for similar farms. The "Country Gentlemen" 1865-1866 contained many notices of farms in New York sold at high prices. In February of 1866 the "Prairie Farmer" stated the outlook as follows: "Now that the war is over, and thousands who have returned must depend upon their own exertions for their support, the case would seem somewhat changed. Farm products, the first to feel a change, have greatly depreciated in value and it is entirely beyond the power of the farmer to pay the wages that have recently been obtained. The long and short of it is; the proprietor finds himself obliged to figure pretty closely if he is to make ends meet, in this year 1866." How nearly this corresponds to our present situation: The world war brought inflated prices and was followed by an era of land speculation, which is the occasion of the most serious results of the present collapse of the market for farm products.

Effect of World War on Prices.

The prices of farm products rose to high points during the late world war and after. The high prices were in part owing to inflation of our currency and in part to the relatively high demand for all commodities. The prices of farm products were above the average of all prices most of the time because of the great war demand for food and clothing. This was especially marked through 1917 and 1918. The regular currents of trade were disturbed and the United States happened to be in an advantageous position for marketing her products in Europe. Owing to the scarcity of shipping, agricultural products did not move freely from Australia and New Zealand to Europe. Russia which, under normal conditions, supplies Western Europe great quantities of wheat was and is still out of the market.

Prices dropped slightly after the Armistice was signed, but within a few months turned upwards again, reaching the highest point in May 1920. From the end of the war to May 1920 the index number of farm prices for farm crops remained relatively higher than the index number of all prices, but the average level of farm prices for livestock products dropped below the general price level in the autumn of 1919 and pulled down the average price level for all farm products. The break in the prices of the staple crops, such as wheat, and cotton, and corn, has been none the less severe because of its later arrival.

Sheep and wool prices increased rapidly during the war and are suffering most because of the entire collapse of the wool market. The cotton farmer, the corn farmer, and the wheat farmer have all suffered greatly. The wheat farmers who threshed early in the summer of 1920 and sold at once have not suffered. The corn farmer still may hope to realize on his corn something more than the market price by feeding it, but the cotton farmer has but one outlet for the American surplus, and that is Europe, where the purchasing power is much reduced.

When we inventory the present basis of agricultural production and compare it with what we had before the war it appears that the land, the equipment, and, now that city industries have relaxed their demand, are we going too far to add, the labor available, are as abundant now as at the earlier date. Many farmers who were heavily in debt at the beginning of the war have had their opportunity to pay out. If they have made use of this opportunity, they are in a stronger position than before the war. They may not be worth as much in dollars and cents as they thought they were a year or two ago, but, if they simply marked their property up during the period of inflation it is a relatively simple matter to mark it down again. On the other hand, the young farmers who have fallen victims to the speculative craze which followed the war and have bought farms on narrow margins at inflated prices are in a precarious position. Many such farmers,

might be better off to declare themselves bankrupt at once and be free to make a fresh start unencumbered, rather than attempt to stand under the staggering load which has been strapped upon their shoulders and for which general conditions, over which they had no control and possibly did not understand, were quite largely to blame.

An Unstable World Market.

This involved financial situation of a considerable percentage of the farmers is, however, not the only disturbing factor in the present situation. While our agricultural basis is still with us in full measure, our market for farm products has been impaired by the War. It has been the common view that the present situation is due not to over production but to under consumption in European countries. This under consumption has been attributed to lack of purchasing power, due to the fact that credit failed before production was restored to a pre-war basis, and without adequate products or credit as a basis of exchange the demand, of necessity, declined. There are those, however, who believe that our European market for food products has not simply suffered a temporary decline but is in the process of passing away entirely, that the European countries are determined to become self-sufficing with respect to their food supply. Whichever explanation of the slump in the European demand be accepted, the fact of the impairment of American Agriculture, through a change in marketing conditions is a present fact to be dealt with. The remedies to be suggested, however, may be different in the two cases. If the European demand has temporarily slumped and will come back so soon as products and credit are available a policy of supplementing the European credit as a basis of buying our farm products might prove more economical for this nation than a reorganization of our agriculture on the basis of a short European demand only to find it necessary to change back to our present types of farming in a short time when the European demand is restored.

Shall We Turn to the Self-Sufficing Economy?

On the other hand, if the European demand for American farm products is passing, no amount of credit abroad will permanently help the situation. Under this condition, if the problem is to be met by restoring demand, it is the home demand which calls for special consideration. If Europe adopts a policy of self-sufficiency our agricultural policy will of necessity have to look in the direction of a self-sufficing national economy, which means a considerable readjustment of our agriculture, especially in the regions where our great staples of export are being raised.

If the United States finds it necessary to look toward a self-sufficing economy, what will it mean in the way of changes in our productions? The outstanding agricultural imports of the United States are wool, hides and skins, sugar and coffee. Our leading agricultural exports are cotton, grain and its products, and pork. It will be readily agreed that it is possible for us to produce more of the wool, the hides and the sugar at home if prices are sufficiently stimulating. The problem is that of readjusting our agriculture so as to reduce the production of cotton, grain and pork and increase the production of wool, hides and sugar. It should be relatively easy to reduce the production of pork and wheat and increase the production of wool and sugar. The big adjustment, so far as cotton is concerned, would need to come through reduced production through a diversified system of farming or from a great expansion of cotton manufactures in the United States, to increase the home demand for cotton, to provide the home demand for cotton manufactures and some cotton products to exchange for Brazilian coffee, and possibly for some Cuban sugar. This would probably mean the turning of some wheat land into sheep pastures, some corn fields into beet fields and some cotton fields into a diversity of food and feed crops. The whole problem of which farmers, or which regions of farmers, should make these readjustments

for the common good is no simple question to answer. No important changes should be undertaken until a sound and permanent national policy can be decided upon, which, will of course depend upon the solution of the great questions of international relations which are now in the foreground.

Need of Retrenchment.

Pending the adoption of a definite agricultural policy, the farmers of this country are forced into a policy of retrenchment, a policy of keeping production expenses down, and a policy of keeping living expenses down by making the farms directly feed the family and provide, so far as possible, the labor and the power required in production. This retrenchment is necessary because of greatly decreased purchasing power upon the part of the farmer which will be felt throughout the whole economic fabric of the nation, and will be felt whether the farmers retrench or not so long as farm prices remain relatively low.

A National Agricultural Policy Necessary.

If this retrenchment and self-sufficing farm economy, with the accompanying stagnating of manufacturing and commerce, is not to become chronic, a national agricultural policy will need be established in the near future which will show the farmers what they may count on in the way of markets for their products. A settled economic policy, whether it be based upon a world economy under conditions of peace and the free exchange of products between nations, all guaranteed by an association of nations, or whether it be based upon the principle of a self-sufficing national economy, which will involve the giving of less thought to foreign trade and more attention to the production for ourselves of all the necessities of life and warfare, it is a settled national policy which is the prerequisite to a settled farm policy.

Should Cut Costs to the Minimum.

In the meantime there is much the farmers of America can do for the read-just-7

ment in their farm organization which will be necessary in the next few years.

The starting point in the readjustments in any business is a knowledge of the facts relating to that business. The market situation, which is a guiding factor in all considerations of farm organization and reorganization has already received attention. The other large group of facts required as a basis of wise farm organization relate to the factors of cost involved in the various lines of production from which the farmer may choose in combining crop and live stock enterprises into a system of farming. The importance of the results of cost accounting as a basis of intelligent farm organization has been too nearly lost sight of during the war period of price fixing. Whatever use costs may be in establishing fair prices, their use as a basis of efficient farm organization should at this time be stressed. In periods when the market situation is fairly settled farmers jog along, falling in line with those who seem to be doing best and who are the natural leaders in their communities, and all get along fairly well, but at this time where the leaders are at a loss to know what to do, equal attention should be given to the establishing of a fairly settled market condition and to the securing of the fact basis in the elements of costs, which will enable the leaders, the bell wethers, among farmers to adjust their farming to the new marketing conditions.

Save by Repairing Old Implements.

There are many ways in which the farmers can reduce their costs if they find that some reduction in product is less to be dreaded than the items of expense which the price of the product will not cover. If the prices of farm machinery were to drop to the pre-war level, by the time the farmer needs machines for the next crop this occasion of slowing up would be removed, but in the absence of this reduction every farmer will find it to his interest to give special attention this winter to repairing old machinery. In many cases the dealers may

not have the repairs, but machinery manufacturers are now urging the buying of repairs during the slack period of the winter. Hearty cooperation on the part of dealers in this should be expected, although the price of repairs will need to decline appreciably, before they will correspond in price with what the farmers have to sell. In the matter of prices of new machinery certain manufacturers seem full of confidence that the prices will not come down in the near future. A publication which purports to represent the machinery manufacturers' interest scouts the idea that manufacturers should be expected to take a loss because of the readjustment. It is claimed that forces over which they have no control are keeping up their manufacturing costs. This is, in a measure, true of the farmers' costs, but the farmer has not found that he could, for this reason, keep his prices up. Either the machinery manufacturers must absorb some of the loss due to deflation or the farmers will have all the more to carry if they continue to buy machinery.

The policy of making repairs can be carried out successfully with small expense by the farmer who knows how to make repairs. The farmer who has less skill and judgment in repairing machinery should first call in his neighbor to help him, resorting to the high priced city machinist for minimum of repairs. This policy can be carried much further if machinery prices remain high than if they are reduced. The farmer buys a machine for the next ten years and if in a few years machinery is coming down forty or fifty per cent it is important to await this drop rather than have too high a machinery charge against the crops for the next ten years.

My attention was once called to a grain binder which had been run for nine

years and had cut about 200 acres of grain and timothy each year. It was in bad condition and the owner was ready to take \$25 for it in trade for a new one when the boy on the farm said "Let me try to fix it." "Go ahead" was the father's reply, "but before you spend the price of a new machine for repairs let me know what you are doing." The boy went to work. He found several parts in the binder badly worn. Not wanting to ask his father to buy these parts now he went to a farmer three miles away who had discarded a binder of the same make and asked to see the old machine. Upon inspection he found the parts which he needed were in good condition. For a small sum he bought the old binder, which the farmer looked upon as junk, took it home and found in it every repair needed for putting his father's binder in good order. At the end of two days the old machine had been put in excellent repair so that it not only went safely through the harvest of that year but was counted a good machine three years later.

Last September a young farmer in southern Wisconsin pulled the corn binder out of the shed and placed it under a shade tree near the road to look it over and make repairs. He was the new tenant on the farm and had received the corn binder from the previous tenant at a very small figure. He had scarcely commenced looking the machine over when a passing neighbor stopped to tell him that the corn binder was worse than junk, that parts of it were scattered all over the farm and that no one could cut corn with it. The young farmer happened to be of the right sort and simply jollied back, replying that he liked junk, -- that any one could cut corn with a good machine but he was in the game to show them how well a piece of junk will work in good hands. About \$7 worth of chains and sprockets were purchased. One large sprocket was broken and could not be replaced so he took it to town and had it acetylene welded. This all took about three days' time when no other work was pressing. The machine cut all his corn, was used to help cut the neighbor's crop, helped to give the young man a standing in the com-

munity and is looked upon by the owner and by the neighborhood as a good machine.

Choice of Power.

The rapid fall in the prices of farm products makes it necessary to revise the figures on the relative cost of horse and mechanical power before making a decision as to the relative profitableness of these two forms of farm power. Horses and horse feed are cheap. Farm machinery, fuel oil, lubricating oil and repairs will need to be reduced very materially before they can again compete on the same basis they did a year ago. Last summer a tractor salesman offered to sell a light tractor for six hundred bushels of corn, when corn was worth \$1.75 per bushel. When he returned in November to make further efforts to close a deal, the farmer told him he would give him six hundred bushels of corn for the tractor but he would not give him anything in cash. The tractor agent could not realize over \$300 for the corn at the later date though at the earlier date it was worth more than \$1000. This illustrates how the purchasing power of farm products has fallen and will impress upon the farmer the desirability of producing his own power until the price of mechanical power is greatly reduced.

Watch Price of Fertilizers.

The farmer will find it necessary to give careful thought to the purchase of fertilizer for next year's crops. Unless fertilizer prices fall in some measure to correspond with the fall in the prices of farm products, it is obvious that it will be necessary for the farmer to reduce the quantity applied per acre, or else reduce the acreage of crops upon which fertilizers are spread. It is not to be expected that the farmer who has already taken a loss on the fertilizer used last season will be expected to take another loss on fertilizers used this year, simply in order that the fertilizer manufacturers may pass through the period of depression without loss. In fact the credit relations which exist between the fertilizer manufacturers and the farmers are often such that it will be equally

to the interest of the manufacturer and to the farmer that the use of fertilizers be given careful consideration, in order that more may not be purchased than can be paid for.

Adjustment of Wages and Rents.

It is entirely probable that the farm wage question will adjust itself by spring. The lack of employment in the cities at the present time will probably result in the wage scale for farm labor dropping back to the pre-war level before many of the contracts are made for the season of 1921. Where this does not come easily, some system of sliding scale wages, based upon the price of the staple products of the farm, would seem to be a means of arriving at a just wage for labor. For example, if the wages of a dairy hand were \$30 and his board before the war, where the average price of milk for the year was \$1.50 per hundred, and if the wages of this same hand went to \$60 and board when milk averaged \$3.00 at the farm, the rate for the coming year should bear the same ratio to the price of milk that it did at these previous dates. This would mean that the farmer would contract to pay per month 20 times the average price of milk per hundred, in addition to board. If milk averages \$2.00 per hundred pounds, this will mean a cash wage of \$40 per month.

Another adjustment which may come too slowly, is that of the amount of cash rent paid for the use of land. There are men in the Corn Belt who have contracted to pay as high as \$18 per acre cash rent for farms. They simply cannot continue to operate and pay this rent out of the proceeds of the farm at present prices. Under the lien system the landlord can take the whole crop and all the tenant's equipment, but that does not help even the landlord's situation, for a tenant is needed next year. The solution of this situation is to contract to pay a fixed number of bushels of specific kinds of grain as rent, or change the lease to a share-rent basis. In either case the result is to let the land owner share

the risk of falling prices and benefit from a rise in prices-- if such a thing as rising prices can be mentioned seriously at this time.

Home Supplies from the Farm.

Thus far the discussion has been confined to the problems of farm operators as they relate to the production for the market. Another method of curtailing expenses is to produce more for home consumption in order to reduce so far as practicable the cash outlay for food. The orchard, the garden, the poultry yard and the feed lot can be made to produce many good things to eat for which we have in recent years substituted purchased foods. Many farmers now see the wisdom of returning to the production of more home supplies, even if this does mean smaller quantities of products for the market.

In order that the retrenchments necessitated by the fall in prices of farm products may not result in a backward turn in the improvement of the standard of living in the country, new emphasis should be laid not only upon the production of fruit, vegetables and meats for home consumption, but also upon the desirability at this time of giving more than usual attention to improving the lawn, and planting flowers and shrubs and trees which will beautify the home surroundings and add greatly to the joy of living without demanding any appreciable outlay in money. With high priced staples demanding attention, it has been easy to neglect these simple means of deriving direct satisfaction and in making the drive for food with which to win the war -- and, incidentally, the cash income which seemed to be coming so freely, -- we have been prone to forget that the environment of the farm home has a value of its own. With lower prices the farmer and his family will find it especially worth while to give more thought to these direct forms of satisfactions and less to those for which a cash outlay must be made.

Problems of Community Life.

Another line of activity which should receive increased attention is the

improvement of the social life of the community. It may be that in recent years many have spent more money than of old in driving considerable distances to enjoy the attractions of the city. This practice tends to discourage the local community life. Now is the time to revive social activities of the neighborhood and develop in the farmers' club the forms of entertainment which are wholesome. While these activities require considerable work on the part of the leaders and some effort and time on the part of every one, they yield a large measure of satisfaction with a small outlay of money.

The Field for Cooperation.

This is a day of collective action or cooperation on the part of farmers, and it is not to be expected that a bad marketing situation is to be faced without some such action. Cooperation among farmers has usually had its start in some difficulty or another in the marketing of their products. How effective cooperation will be in solving the present problem depends on whether the difficulty lies in the earlier stages of the marketing process or in the lack of purchasing power on the part of would-be consumers. There is doubtless chance for the improvement and the cheapening of the marketing process which will in some measure relieve the situation. Even in this matter which has always received hearty approval in normal times, farmers should now move with caution. Warehouses are now expensive to build and will doubtless depreciate rapidly as deflation goes on. It is much easier to make dividends on a rising than on a falling market. With due caution, however, this is an opportune time for the promotion of cooperation.

The National Viewpoint.

We have discussed the subject of readjustment from the standpoint of the farmer looking out for his own interest. It is obvious that the conservative policy which has been indicated will temporarily serve the best interest of the

farmers on the condition that the prices of farm products remain low and there is not, in the very near future, a corresponding fall in the prices of things other than farm products.

It must be clear that if farmers take this logical step and slow up their buying upon the market the result will be to slow up other industries, and the trade in all forms of products. When the subject is considered from the national point of view it seems unfortunate that farmers may be forced to retrench in order to meet the emergency. It would seem that there should be some other way out.

Never has there been a time when the right solution of farm economic questions was more important than today. The problems of farm organization, land tenure, farm finance, marketing, country life, and a national agricultural policy are economic question which demand the attention of the keenest minds and the best judgment the world can afford.

There is No Panacea.

This is a period when the leaders of the American farmers have a grave responsibility placed upon their shoulders. Breadth of view and common sense are valuable assets in these trying times. If there is any one thing above another to be avoided it is the danger of putting too much faith in any one outside adjustment as the remedy for the present unhappy situation and giving too little attention to what the farmers, themselves, should do.

To illustrate what I mean by looking too entirely to one remedy and ignoring others equally if not more important, attention may be called to the view held by a leader of farmers who was in Washington recently. Stated briefly it is this:

"The farmers will take care of the production problem without any other aid from the Department of Agriculture and the Agricultural Colleges if only they

will provide an outlet for farm products at a satisfactory price.

This would certainly be a boon to the farmer. It would greatly simplify the problems of farm management if the markets could be so controlled as to absorb at a satisfactory price anything which the farmers may choose to produce and in any quantity which the effort of man and the response of nature may determine. Those who feel this to be a simple task should not overlook the fact that it involves the full control of the desires of the consuming public and the power to so adjust these desires that the demand would always equal the supply at a price satisfactory to the farmer. It has, apparently, been assumed by some that essentially this result can be attained through educational or booster campaigns to increase consumption. What can be done in this direction is very limited. Something can be done to swing consumption from one line to another, but this method can have little effect on the demand for staples and probably have little effect upon the total demand for farm products. If any one should discover an Aladdin's lamp or any other magic instrumentality which would enable him to control consumption completely and at the same time, guarantee the happiness of the consumers he would find a large field of activity. Pending the discovery of this or some other panacea, it is believed that 90 per cent of what the farmer can now do to improve his marketing situation consists in the adjustment of his production to the demands of the market. The remaining ten per cent lies largely in the field of local cooperation with a view to providing facilities which would otherwise be lacking, and to avoiding unfair charges for middleman services.

The Farmer Needs Facts.

As to what the Department of Agriculture, the Colleges and Experiment Stations can do to help the farmer solve the marketing problems, three-fourths consists in providing in an intelligible form the fact basis, through research and education, in the light of which the farmer must act in adjusting his farming operations to the demands of the market. The remaining one-fourth lies largely in

operations to the demands of the market. The remaining one-fourth lies largely in the field of a careful study of the marketing processes and the cost of middleman services, the establishment and administration of grades and standards, controlling the quality of the middleman services and protecting producer and consumer against unfair charges for middleman services.

I do not wish to be understood as minimizing the importance of cooperation among farmers. In fact, I believe that in addition to the functions mentioned above, much of the adjustment of production to the market, especially with regard to the kinds and qualities of the products, will be promoted by cooperative marketing undertakings. But, I do wish to give especial emphasis at this time to the idea that the marketing problem, so far as it is a problem of securing a satisfactory price for farm products, is to be solved largely through the adjustment of the supply to the anticipated demand and must come in large measure through the right direction of production.

One cannot be oblivious in this connection, of course, to the fact that the farmer sows definite acreages without knowing in advance what the result will be in bushels. In this his position is entirely different from that of the manufacturer. This adds greatly to the complexity of the problem of adjusting the supply of farm products to the demand. It is believed that public spirited people in general would look with favor upon a system which would tend to overcome the irregularities in the supply upon the market due to natural forces. Of course the control involved in carrying out this policy should be so exercised as to guarantee fair play for the consumer as well as the producer.

If he is to act intelligently in the management of his farm, with a view to the right adjustment of supply and demand, the farmer must be provided with adequate knowledge of the world's probable needs and the production of the various parts of the world to meet these needs. He must know not only the quantities pro-

duced in the various countries but the comparative costs of production in each of the competing regions of the world, including the cost of putting the product on the common market. He needs to know not only the present condition of production and consumption throughout the world, but he needs to know and be able to interpret the changes which are taking place in production and in consumption in order that he may be in a position to adjust his farming to changes which affect prices and profits in given lines of production.

Research and Extension Furnish the Facts.

To illustrate: Take the present cotton situation. The price of cotton is unsatisfactory. What can be done about it? The facts with respect to world demand can and should be studied. The facts with respect to production and changes in production can and should be made matters of common knowledge. These facts known, what is the next step? Shall we count on stimulating an increased demand which will take care of the supply at a price satisfactory to the farmer, or shall we look to the readjustment of supply through the readjustment of production? While the stimulating of demand is not to be ignored it is to the readjustment by production that we must look primarily for the solution of this problem. This means the production of more of other things and less of cotton. This is something tangible and can be done, but it involves a knowledge of what other crops can be grown, how they fit together into a system of farming with a view to economy in production, the cultural methods best suited to each crop, the pests which must be encountered in their production, the disposal of some of the new kinds of crops through livestock enterprises which, in turn, must be fitted into the new system of farming with both the costs of production and the market conditions clearly in mind.

In other words, the readjustment of production in order to meet a changed marketing situation involves about everything the Department of Agriculture is

doing in the Bureaus of Plant Industry, Animal Industry, Soils, Entomology, the Biological Survey, Farm Engineering and the Weather Bureau, as well as Farm Management and Markets. Thus it is that agricultural reconstruction presents problems in the right adjustment of production to the demand, the solution of which requires the united efforts of the workers in every line of research and extension, working in close and most sympathetic cooperation with farmers and farmers' organizations. In this problem of adjusting production to market conditions the farmers themselves must play the leading part. They must pass final judgment on what is to be done. In this our role is that of research and education, which will give basis for straight thinking and intelligent action on the part of farmers.

MR. O. C. STINE, Agricultural Economist, Office of Farm Management and Farm Economics. "Historical and Geographic Studies as a Basis for Readjustment." -- Whether we take a long time view or a short time view of markets and market prices, we see frequent changes and sometimes very abrupt and radical changes. I have heard it said that the only safe course for a farmer in the face of fluctuations in prices is to continue the same kind of farming. This is probably as good advice as any when prices are moving up and down and the causes are unknown. Many a farmer sees no reason in prices and follows an unchanging course throughout his life time or until he is compelled to change. On the other hand, there is the farmer who is changing his crops or his livestock products every year in response to the prices he has received for the products of the last year. He thinks the little wave of high prices for some products may be a swell upon which he can ride to high profits next year by growing the high priced product. There are enough of such farmers in the United States to make the acreage of some crops move up and down just one year behind prices.

Let me give you an illustration. See how wheat responded to high prices in the fall of 1914 and the spring of 1915, and then what happened in the fall of 1915 and spring of 1916.

Such movements have led some to adopt the philosophy that a farmer should act directly opposite--when the price of wheat is low, plant wheat; and when the price of wool is low, buy sheep. The farmer who adopts this policy may be wiser than the other farmer, but he too may be operating in the dark. Both of them are playing the game, as with dice: up comes the

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price, up goes the acreage or down goes the acreage. Farming would be a sorry business if all farmers followed any one of these courses: (1) continued to grow the same crops and keep the same livestock whatever happened to prices, (2) increased the acreage of the crop or number of livestock when the prices of the previous year had been high, or cut them when the prices had been low, (3) or did the opposite, increase the acreage because the prices had been low and cut it because they had been high.

The good business farmer is the man who organizes his farm and determines what to produce on the basis of what he expects when his products come to market. He estimates the price he will receive for the different products and considers the costs. He can vary his costs, within limits, to produce with some profit, if he can foresee prices. He needs to be a price prophet. To estimate the prices he will receive for his next crop, the farmer must first have an explanation of the situation up to date, he needs to know what has produced it, and what is the trend of prices, on the one hand, and of production, on the other hand. It is our task, I take it, to point out to some farmers what are good business principles in farming, and to help other farmers obtain the information they need.

Historical studies will help us to diagnose cases, suggest remedies where mistakes are being made by pointing ^{out} / similar errors in the past, and to point out the trends in prices and production which will help the farmer to make his forecasts. We believe the historical studies will prove especially valuable in showing trends of agricultural movements. In the first place, some people need to be impressed with the fact that changes

in farming do occur, that even the types of farming of whole communities are revolutionized by changed in market conditions. Shifts in wheat growing and dairying are interesting illustrations of changes that have been effected.

A brief outline of the history of wheat--

A brief note of dairying--

The successful farmer is the man who catches the drift of such changes and takes the lead in the direction of the new type of farming. Some men have found it difficult to make such changes and have moved on with the shift in the type of farming which they knew best.

These shifts in production studied in relation to the settlement of our country, the development of transportation, the growth of population, the development of great manufacturing cities, foreign markets, and production in foreign countries help to explain the present situation and give us some light on the probable future.

Let me illustrate by charts on wheat production, prices, and exports.

Prices:

Exports:

Production:

Competitive Producers:

During the war period prices moved very much as they have in previous war periods. The price of wheat has dropped back to about \$1.75 per bushel. The price next year depends upon the growing seasons in the great surplus producing countries, the ability of importers to buy wheat, and upon Russia's position in the wheat market. Suppose

Russia comes back into the market, and the European importers recover so as to consume wheat on the pre-war basis, what of the future of our wheat markets?

To simplify illustration I have presented facts concerning wheat apart from its relation to other crops. In making readjustments all the operations on the farm must be considered in relation to each other and as a whole. In some parts of the United States wheat is the dominant crop but in other parts it enters into a rotation with other crops and in places plays a minor role in the farm business. Its place in the rotation depends to some extent on the market for wheat compared with the market for other crops such as oats and barley which may take its place in the rotation.

In making readjustments in farm organization and farm practices to meet changes in prices the farmer must understand the natural conditions under which he operates, and which he cannot change. The farmer cannot change his climate and what cannot be changed must be endured. When an extension agent goes to a farmer with advice as to changes in his organization and his practices he should know what are the natural limitations upon what the farmer can do. And remember this it is not only the climatic limitations, upon the growing of a crop, that is to be considered but also upon the amount and kind of work that the farmer can do, and the seasonal labor requirements of all the crops grown on the farm.

The good business farmer will keep his eye on the market not only to determine when to sell, but what to produce and when to produce it. To understand the market he must know the causes of prices. To forecast

the market he must know the conditions of demand, and the resources and activities of his competitive producers. Finally he must know the limitations, both natural and economic, upon what he can do. In Agricultural History and Geography we labor in the hope that we can help the farmer to form better judgments on how to make the proper adjustments in his business to meet the prospective requirements of the market.

DR. C. J. GALPIN, Economist, Office of Farm Management and Farm Economics. "Practical Applications of Rural Social Research" - Touching the human side of farming as contrasted with the purely agricultural and the strictly economic, a body of knowledge is slowly taking form in your state; and your organization is giving currency to this knowledge, and gradually building up a doctrine or school of thought on farm life for your farm families and farm communities to round out your state ideal of agriculture as an occupation and a mode of life.

What, now, is to be the character of that body of knowledge which is to determine your country life philosophy and community practice? Is it to be such as the ordinary experience of busy men and women gathers together; or is it to take shape also from the more careful study of specialists on the movements, habits, and groupings of farm populations? The farmers' institute of the early days, as well as the Grange and other farmers' organizations decorated their programs with talks on the "Farm Home," "The Farm Boy and Girl," "Better Rural Churches," and the like. The sentiments uttered by the speaker drawn from experience found response in the hearts of the audience, and no program was complete without this tribute to the life elements in farming. But in agricultural and economic matters your extension forces are all going far beyond ordinary, casual experience. You are democratizing or farmerizing, if you please, the findings of the fundamental sciences allied to agriculture. No occupation of common men is being so unreservedly let into the mysteries of science. The

body of agricultural and economic knowledge which you are building up in your state is more and more of a thoroughly studied, and scientifically tried out character. It is my part this afternoon to say to you that a body of knowledge on the life side of farming, drawn solely from ordinary experience and every day sentiment, will not adequately supplement a scientific agricultural and economic state policy. In fact, the cap to many an excellent agricultural and economic program waits for a scientific analysis of community life to go along with it.

There are at the present state of the development of rural sociology two types of knowledge which can well enter into the makings of a state doctrine of the farm life, institutions, and community growth of each state:

The first type of knowledge may be considered as a transition from ordinary experience to science: viz. a What's What of the best specimens the state can afford in community practice and community achievement, covering the whole range of rural social life. This body of knowledge of the Best Things Rural and Social accumulated by every College and given currency in the state will be the first step toward a morescientific program.

Perhaps the first volume of such a Rural What's What is a simple directory of agricultural organizations in the state. Several states, notably New York, already publish such a booklet. Our Office has published such a directory for state and national organizations. A second volume of a "Rural What's What" could set forth the best examples of rural community buildings in the state. Every state has some to show. This Office has made a study of such buildings in

the United States. The results are in three volumes. Two are soon to be issued from the press. I lay a great deal of emphasis in my own mind upon this What's What for each state. Our Office will gladly assist any state in planning such a series.

A "Nebraska Rural What's What" given currency by the State Extension force would be a stepping stone to a more scientific type of knowledge of the human phases of farm life in Nebraska. An interchange of What's Whats from state to state would be stimulating.

The second type of knowledge, which I characterize as a body of scientific knowledge, would be the result of study and analysis of complex rural social situations in the state, - usually beyond the fathoming power of casual experience and observation. Such a situation is that of farmers leaving the farms for city life and occupations. Migration from farms over a series of years is a complex rural social situation which will yield absolutely to research. Facing the bogie of "decrease of rural population" with a careful body of knowledge about the history of specific farms in specific communities will arm for danger and disarm panic. Why should not the extension force be provided with the facts on this matter in each state, so as to fight the menace, if a menace; so as to allay alarm, if there is no cause for alarm? This Office has studied one community's migration of adolescents over a period of 100 years, and will gladly assist any state college to make studies of migration in its own state.

Migration is only one of the troublesome complexities which face a rural population on the human side. And these psychological and sociological complexes, it must be admitted, often present the chronic difficulties in the way of the agricultural and economic program. It is my part simply to point out these two types of knowledge on the human side of farming, and to assure you that this Office stands ready to assist each state in its task of accumulating such knowledge and disseminating it to the last man in the last community of the state.

COLONEL W. B. GREELEY, Forester. "Make the Woodlot a Permanent Asset of the Farm." -- The people of the United States are realizing more and more that an abundant supply of timber is a necessity of twentieth century living requirements and industries no less than of the pioneer period in our development. Many illustrations may be cited to demonstrate this fact. Recently I was greatly impressed by the needs of the citrus industry in Florida for a permanent supply of wooden boxes with which to market its crop. Thirteen million boxes are now required yearly in placing Florida oranges and grapefruit upon the market and within ten years the yearly requirement will reach 40 million boxes. Each box calls for $5\frac{1}{2}$ board feet of timber, and a permanent and assured supply of these containers is one of the things now giving concern to the citrus industry of that State. In the highly developed agricultural States of the upper Mississippi Valley, the average use of lumber annually on every farm, for new structures and repairs, amounts to 2000 board feet. This represents the normal requirement of efficient twentieth century agriculture in that region. The per capita consumption of paper, which is made largely from wood, is 125 pounds a year as compared with 30 pounds in 1880. The development of our manufactures tells the same story. The per capita use of lumber in industrial centers like Chicago or St. Louis is from two to four times as much as in the country at large.

The countries of continental Europe which are much older than our own use but one-half or one-third as much lumber per capita as the people of the United States; and this might indicate that the older we grow the less wood will we require. But that conception does not fit American standards of living or American industrial requirements. Picture a rural section in France, where a new structure of any kind is rare and moss-grown stone farm buildings, built during the Middle Ages, must still serve the needs of the French farmer of today. With all its picturesqueness you can not fail to carry away an impression of economic decadence, of living conditions that are hard and comfortless, and of agricultural methods that are inefficient. Contrast that picture with an average rural section in New York or Iowa, and you will understand the difference between a country where timber has been plentiful and cheap and a country where wood almost belongs with the luxuries.

The difference between the United States and continental Europe is not the difference between a young country and old countries. It is the difference between a country of high standards of living and of industrial energy on the one hand as compared with countries of low standards of living and industrial conditions largely fixed and unchanging on the other. Abundant forests have meant for the United States homes for the masses of our people beyond the standards of any other nation on earth. They have put magazines and

newspapers on the average family table. They have encouraged constant industrial expansion and initiative. They have promoted living conditions, optimism, and constructive energy which make for a stable democracy rather than the discontent, the lack of opportunity and the destructive social forces which breed bolshevism.

We need an abundant supply of timber now just as much as ever before. Many substitutes are replacing wood for particular purposes, but the aggregate demands of the country for timber are growing all the time. More wood is used in building houses today than before concrete was invented. More wood is used today for building cars than before the steel car was devised. We can not decrease our use of wood as we grow older nationally if social and industrial progress are to keep pace with age.

Up to the present time we have been a nation preeminent as wood users but we have not been a nation of wood growers. We have subsisted upon our wonderful heritage of virgin forests without taking any adequate pains to replace them. We are beginning to feel the real effect of the steady depletion of our forests which has been going on ever since this country was settled. Three-fifths of our original timber is gone. The sawmill has moved over the country cleaning up one region after another until many of our old sources of timber supply are practically exhausted. Fifty per cent of the remaining timber in the United States is now in the three States bordering the

Pacific Ocean, and every year larger and larger quantities of lumber are shipped across the Plains, 2000 or 3000 miles to the consumer. The average freight paid on lumber today is more than the lumber itself cost 30 years ago.

The crux of this problem lies, not in the liberal use of our forests, but in the failure to use our forest growing land. Enormous areas of timber growing land have been reduced to practical idleness by destructive logging and still more destructive forest fires. We have some 80 million acres of forest land, most of it unsuited to any other use, which is now practically idle as far as the production of any material of commercial value is concerned. And we have other enormous areas of land whose production of wood is but a fraction of what it might be. Every year an area as large as the State of Pennsylvania is swept by forest fires.

During the last two years we have felt sharply the effects of a shortage in the lumber supply and of excessive prices on most forest grown materials. The country is short today 1,250,000 homes; that in turn means exorbitant rents and crowded living conditions. The use of lumber on farms has dropped off to a marked degree, and that can not go on very long without seriously affecting the standards of rural life and the efficiency of agriculture.

The answer is that we must become a nation of wood growers. We must put our millions of acres of idle land at work.

This is peculiarly a question which interests farmers.

The farmer is at one and the same time the largest consumer of timber in the United States and the largest owner of timber growing land. Woodlots attached to farms in the Eastern States aggregate the enormous figure of 178 million acres, averaging 35 acres per farm. They contain 45 per cent of all the forests in the States east of the Great Plains and 40 per cent of all the merchantable timber in that region.

The farm woodlot has not figured largely in the development of American agriculture. It has been regarded as a bit of wild land, as something that would take care of itself, as something not requiring the skill and intelligence applied to production of field or orchard crops. In many instances, it is true, woodlots occupy land which sooner or later will be in demand for tillage and can not therefore be regarded as a permanent feature of the farm. In many other cases, however, abandoned fields and pastures and unimproved land are gradually going back to forest growth. Many farms contain areas of poor land which will produce the highest revenues by growing timber.

The main point is that we should take the farm woodlot seriously; that we should not look at it as an accidental thing but as a resource of the farm to be developed with the same degree of pains and business sense which the intelligent farmer applies to the rest of his property. The wood lots form a very important asset to the farms and they also form a very important asset to the nation. Their present yield of marketable products, in excess of 300 million dollars worth a year, figures very high

among all the returns from farm holdings; and that yield can be enormously increased and can be made permanent and stable if we will regard the production of timber on lands not suited to other crops as a permanent and valuable feature of American agriculture.

The great forest problem of the country is the problem of idle land. A considerable part of that idle land is today in the form of farm woodlots. It is to the interest of the farmer and to the interest of the nation to put that idle land at work. Let us elevate the woodlot, on land where it belongs, to its proper place as a permanent asset of the American farm.

PROFESSOR C. V. PIPER, In Charge Forage Crop Investigations.

"The Forage Situation." -- It is my aim to present to you concisely the larger forage problems of the United States, or perhaps better the problems that we regard as most far-reaching. Clover and Clover Failure:- In the decade from 1899 to 1909 the acreage of clover in the northeast quarter of the United States decreased about 40 per cent. In the area comprising New York, Pennsylvania, and New Jersey the decrease was 65 per cent; in that containing Ohio, Indiana, Illinois, Wisconsin, and Michigan, 46 per cent; in the area of Kentucky, Virginia, West Virginia, Maryland, and Delaware, 44.2 per cent; in Minnesota, Iowa, and Missouri, 25.7 per cent. Clover in these figures includes red, alsike, crimson, and sweet. The figures of this decade represent a part of the decrease that has been spreading from the east to the west beginning forty years ago. In general the trouble is referred to "clover-sick" soils, but not one nor all of the theories advanced as to its cause shed much light on the phenomenon. What the census of 1919 will show will be of importance. The available information indicates that the trouble is still increasing, but the decrease in acreage for the past ten years will probably be much less than for the decade before.

The decrease in acreage noted would have been greater but for the general use of alsike either alone or mixed with red clover, and more recently by the increased use of sweet clover. Stands of both alsike and sweet clover are much more easily secured than in the case of red clover.

Abundant experiments have shown that red clover stands can be assured either by the use of barnyard manure or by the use of lime

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especially with phosphates added. Notwithstanding this knowledge it is doubtful if the decrease of clover acreage has been stayed. The average farmer will not grow a crop unless it is practically fool-proof.

If some of our generally accepted agronomic conclusions are well founded, this decrease in clover acreage must have affected the yields of all the other crops. Clover is practically the key-crop of all northern rotations. Large clover crops are usually followed by good crops of the rest of the rotation, and clover failures have the reverse effect.

Clover seed production shows the same decline as does clover acreage, reflected also in the high prices of clover seed. The crops of seed declined steadily from 1890 to 1915; in Missouri by 75 per cent; in Illinois by over 50 per cent; in Ohio about 25 per cent; in general about 50 per cent, notwithstanding the high prices of clover seed.

The statistics of 1919 will be illuminating in regard to the recent progress of clover failure. If its progress has not been stayed - and the indications are that it has not, - the problem is one that calls not only for more research but for much more active educational work to meet this great menace. It is safe to say that if one-tenth of the loss had been occasioned by a new insect or new disease, it would have called forth strenuous efforts to control the pest. But the insidious advance of "clover sickness" has been so gradual that its terrific menace is not generally recognized.

Alfalfa.

No other American crop has been the subject of as much vigorous promotion as has alfalfa. Has this propaganda given results commensurate with the effort? In 1899, 1.1 per cent of the alfalfa acreage was east of the Mississippi River; in 1909, 3.9 per cent, nearly fourfold. Much,

perhaps most, of this increase has been on good alfalfa soils. Very many of the actual farm patches are transitory. Alfalfa is a crop with peculiar requirements, which must be met or else failure is practically certain. It is in no sense a fool-proof crop in the east. In general it is believed that its culture should be encouraged on soils not especially suitable only to special farmers, especially dairymen. Alfalfa has been no factor of consequence in meeting the menace of clover failure. The data of the 1919 census, when available, need to be considered carefully by the Extension Service in determining the wisdom of active alfalfa campaigns in the east particularly on soils not well suited to the crop.

Pastures.

For every 100 acres of other crops on farms in the United States there are 91.5 acres of pasture, of which about one-third is listed as "improved pasture." Corn is the only crop that exceeds in acreage improved pasture.

Pastures have been the most neglected of all important farm crops. Most of the experimental investigations thus far have been of a relatively trivial character. This is due largely to the costliness of really worthwhile experiments. The data should be obtained in terms of pounds of milk, meat, or wool per acre. This of course involves the use of large units of area, ample livestock, and all the equipment necessary to handle the animals satisfactorily.

Some years since an ample series of experiments on typical bluegrass pasture was conducted cooperatively with the Virginia Experiment Station. These experiments showed clearly that heavy pasturing resulted in twice the returns that light pasturing as generally practiced gives. Furthermore, after heavy pasturing the

pastures were in much better condition. Alternate grazing showed no advantage over continuous grazing. The results show clearly that pastures in general are being utilized only to one-half their productivity, and that this light pasturing is to their detriment. Comparable results were later obtained in North Dakota and in Utah.

The prejudice against heavy pasturing is due partly to the desire of the farmer to avoid the possibility of a shortage of pasture and partly to the idea that heavy pasturing is injurious to the grass. Sacrificing half the value of the pastures is a much more costly insurance than a reserve of hay or silage, and besides the old grass in humid regions is eaten by animals only to prevent starvation. Overgrazing of a creeping grass that will injure the stand is not possible as long as there is sufficient to fill the animals' stomachs; on bunch grasses it is quite otherwise, as these can be destroyed by overgrazing.

The whole subject of pastures is in need of thorough investigation both agronomically and economically. Indeed the matter is of pressing importance for all the principal regions of the United States.

Utilization of Idle Lands.

The pasture factor is one of importance in connection with the utilization of lands now lying idle. A conspicuous case is the cut-over lands of the southern coastal plain. It seems certain that the timber for export lumber trade of this region will be exhausted in ten to twelve years. To keep this area productive the only economic possibilities are reforestation and grazing, or the two combined. Farming in the area is likely to develop only slowly under the compulsion of increasing population. Reforestation is faced with two difficulties, namely the doubt as to profitable returns, and even assuming a reasonable profit the inability to finance such a long-time project. The grazing industry can develop

above its present primitive status only by the aid of improved pastures. It is now demonstrated that such improved pastures can be cheaply established on more than one-half of the cut-over area. The only cloud in the way of this pasture-livestock development is the probability that pasturing in a way comparable to that in the north will increase the losses from various animal diseases.

The Western Range Lands.

The range lands of the semiarid regions constitute a great resource to every state in the west. However great be the extension of dry-land farming it is certain that enormous areas must be used solely for grazing. To increase the carrying capacity of these ranges is manifestly a matter of great importance. Two methods are possible. The first is rational grazing, including the destruction of injurious rodents, which will return the ranges to their pristine productivity. For this, control of fencing is necessary. In general, the ranchman with control of the land will bring back its carrying capacity; but doubtless there is room for much investigation to determine the best method of management for range of each character.

Over and above this there is every reason to believe that the introduction of new range grasses will greatly increase the carrying capacity. Thus in California over 80 per cent of the lowland range forage is now made up of introduced plants, such as wild oats, wild barleys, bur clover, alfilaria, etc. etc. A similar process is going on in the Columbia Basin. In other areas such introduced plants as the Russian thistle and rosy saltbush, both from Central Asia, have spread over much of the range. Poor as these two plants are for forage, they are assets on the range rather than liabilities. There is every reason to believe that Central Asia can give us many good grasses and legumes that will spread over the western ranges in the manner of Russian thistle, and thus greatly increase

1. The first part of the document is a list of names and titles, including "The Hon. Mr. Justice" and "The Hon. Mr. Justice".

their carrying capacity. It is always to be remembered that nearly all the good grasses of the North, of the South, and of California are introduced species, and it is inconceivable that a similar result will not follow in the different dry range lands when we find and introduce species adapted to the conditions.

New Forages.

It is rather peculiarly a function of the Department to explore the world for new plants of economic value. As regards forage, it has been the experience that out of thousands tested only a few are of real value. But one such plant repays many times the cost of testing hundreds. Among the valuable forages thus found and introduced are Sudan grass, Rhodes grass, Giant Bermuda, Carib grass, Bahia grass, Napier grass, Peruvian alfalfa, many new sorghums such as Feterita, Hegari and Red Amber, valuable new soy beans, new velvet beans, Ladino clover and several others of lesser value. Out of the 5000 grasses and 8000 legumes that exist there are still endless possibilities to find winners.

DR. CHARLES THOM, In Charge, Microbiological Laboratory, Bureau of Chemistry. "Some Bacteriological Phases of Canning." -- The Microbiological Laboratory of the Bureau of Chemistry has been investigating the subject of food poisoning for several years. Food poisoning takes two forms, the fatal form which has been given a great deal of public attention due to series of outbreaks involving the deaths of groups of persons and has become well known under the term "botulinus poisoning" or more accurately "botulism"; and second, the enteric type of poisoning in which the number of persons affected is very much greater but the death rate is very much less. This type of poisoning involves a very large percentage of the population at one time or another and a total of deaths per-

haps exceeding that of botulism but the number of fatal cases is so small in proportion as to ~~excite~~ less comment than the terribly fatal form which has been so widely recognized in recent years.

Confining, therefore, our discussion to botulism and its relation to canned goods, the general status of the investigation may be discussed under three heads, the responsible organism, the method of canning, and the precautions to be observed in eliminating the trouble.

The responsible organism.

The responsible organism is known as *Bacillus botulinus*, an anaerobic bacterium belonging to the group producing putrefactive odors. This organism is widely distributed in nature and accompanies many other organisms as contaminations in various foodstuffs. It has apparently been the cause of the death of a great many domestic animals which have died of the disease known as forage poisoning. It is not, therefore, limited in its occurrence to canned goods. The poison itself (toxin) is produced by the growth of the organism in the foodstuff. The organism can be filtered out of the foodstuff, and leave the toxin at its full virulence. This toxin is readily destroyed by heat so that if the entire mass is brought to the boiling point, it will no longer produce the symptoms of botulism. Some strains of the organism, however, produce resistant spores which are not killed by ordinary boiling. Thus *Bacillus botulinus* becomes a factor in canning.

The method of canning.

The relation of this organism to canning lies in the fact that a properly prepared can of food is free from air; therefore becomes a favorable medium for an anaerobic organism. The cooking to which the can is subjected destroys all of the miscellaneous organisms which may be present, leaving only the spores of this species and certain related types capable

of withstanding the heat. The resulting can is, therefore, an exceptionally good incubator for *Bacillus botulinus* and its toxin. No system of canning thus far devised has been perfect enough to insure sterility of every can. The amount of heat used may not be sufficient in some cases. Imperfections in the apparatus, jars, cans and gaskets, and in the operations of canning account for the loss of a small percentage of the product, no matter how carefully the rules of canning are followed. This applies both to home and commercially canned goods. The purpose of canning is to keep food from spoiling and the fact must be frankly recognized that a certain percentage of goods is going to spoil, no matter what the method used. Since it is impossible to guaranty that every can will keep and since it is impossible to tell you which spoiled can is dangerous, the canner must recognize the spoiled can as a legitimate loss which must not be salvaged for human food.

Precautions.

Now, how are we to detect this dangerous can. Spoilage in the can is recognized in various ways. In tin the most prominent evidence is a swelled can. A normal can shows both ends depressed, due to a partial vacuum. Most forms of decomposition involve the production of gas which relieves the vacuum first and then produces internal pressure, forcing the ends of the can outward ("swell") or causing a leak, at some of the joints so that the jar or can when examined is seen to be under pressure or to have become a "leaker" as shown by the stain on the label or discoloration at some of the seams. This may frequently be detected by the occurrence of bad odor at the discolored or suspected places in the unopened container. The odor of a spoiled can when opened is usually characteristically offensive in some form. The odors to be recognized vary from merely sour to actually putrid types. The contents of the can may or may not show disintegration, that is

evidence of breakdown of texture. Some of the most dangerous and offensive forms of spoilage show comparatively little change in the physical conditions of the products within the can. Other forms show very extensive disintegration. In cases of spoilage the liquor is usually cloudy or turbid.

The person who opens a can of food should, therefore, give heed to the appearance of the unopened can, and to the odor and consistency of its contents before even tasting the product. If the can is obviously sound and the odor and appearance of the product characteristic for the particular foodstuff, it has been found safe to taste. If the taste is true to the product canned, it is safe to serve for human food.

It must be admitted that there is a vague possibility that dangerous food will pass such inspection as this but such inspection would have eliminated the food actually responsible in every case of death from botulism in which the Bureau of Chemistry has actually obtained the product responsible.

Further, in many cases in which we have not actually had the material responsible for the death of the individuals, the records of the cases show that the spoiled nature of the food consumed was known at least to some of those who handled the product. This has been conspicuously true in some of the most recent cases involving the death of a considerable number of persons. We, therefore, feel justified in advising (1) that spoiled food be discarded, not salvaged and eaten; and (2) that the evidences of spoilage in so far as they involve danger of botulism are easily enough detectable to justify the statement that the person who opens the can is responsible for their destruction.

DR. MILTON WHITNEY, Chief, Bureau of Soils. "The Fertilizer Situation." -- At this meeting of the State Extension Directors, I thought you would be interested in the fertilizer situation, particularly in the

The first part of the book is devoted to a general survey of the history of the world, from the beginning of time to the present day. The author discusses the various civilizations that have flourished on the earth, and the progress of human knowledge and art.

In the second part, the author turns to a more detailed examination of the history of the United States. He traces the growth of the young nation from its first settlement to the present, and discusses the various events and movements that have shaped its development.

The third part of the book is devoted to a discussion of the future of the world. The author considers the various theories and predictions that have been advanced, and offers his own views on the course of human progress.

The book is written in a clear and concise style, and is well illustrated with numerous maps and diagrams. It is a valuable work for anyone interested in the history and future of the world.

price situation, which has become a very serious problem with the recent break in the fertilizer material market the credit situation and the sub-normal buying power. You know that the Lever law, which is still in effect, and the President's proclamation and regulations issued thereunder, while not authorizing the fixing of prices, imposes the duty on this Department of preventing excessive or unjust profits.

When this matter was taken up, we were fortunate in having the report of the Federal Trade Commission, published in 1916, of an investigation that had been made of the fertilizer industry for the Senate in which they gave the detailed items of the cost of production of commercial fertilizers for five years. They also determined the profits on the sales and showed that the average net profits during the five years preceding the war amounted to about 10% of the sales but they did not attempt to investigate the profits on the capital investment and neither have we. From the results of the Federal Trade Commission investigation of the relative cost of material, labor, selling and general overhead expenses, we have been able to keep the price of commercial fertilizers down to about the same relative profits as were made in the prewar period.

On or about the first of October 1920, the fertilizer manufacturers sent in schedules of prices for the spring of 1921 differing in individual cases but based substantially upon the following figures. Ammonia \$5 per unit, phosphoric acid 80¢ per unit, potash \$2.25 per unit, shrinkage 2% of the above values, the manufacturing costs including labor, selling, freights, bags and overhead \$12.75 per ton, and gross profits 15%. This gives the price at the Atlantic ports to which is to be added delivery freights for interior points. It is subject to a cash discount of 5% and is for carload lots. The Department has kept a complete record of the cost

of material from week to week so that we have had a fairly complete record of the cost of material. The Department has had no funds to investigate factory costs but has relied upon an occasional examination of the books and records of certain companies and upon the proportion of manufacturing costs to costs of material as established by the Federal Trade Commission after their exhaustive investigation.

During the first part of the year 1920, we were all of us worried about the stock of material that would be available for fertilizer use. The organic ammoniates had been going very largely to feeding stuffs, the price was high, and comparatively little of it was being used for fertilizer purposes. The stock of rock phosphate was short due to the strike in the Florida fields in the previous year and the car shortage and much anxiety was felt as to whether sufficient stocks could be accumulated. The export demands were great and the prices for export rock were high, with a corresponding effect upon domestic manufacturers who had not long-time contracts at low figures or who could not secure deliveries on these contracts.

The potash situation was very obscure. The production of domestic potash was uncertain because of the uncertainties of the volume and price of the foreign salts. No agreement seemed possible as to price or deliveries of the Stassfurt salts or from those from the Alsatian fields. These matters all tended to make the situation very obscure and very difficult to foresee.

In the early part of 1920, the export demand for ammonium sulphate was very great. Prices were quoted on the basis of New York for export ammonium sulphate in double bags at around \$7 to \$7.50 per 100 pounds. In March the domestic manufacturers felt that in order to retain a sufficient

stock for domestic use that they should enter into contracts which they did at around \$4.60 per 100 pounds at the works.

When the fertilizer manufacturers determine on the prices of their finished products for the spring season, they usually issue price lists in October or November of the previous year and the prices are supposed to hold until July of the following year.

As early as February, Washington felt that a break was coming in the material market but as late as May or June it was rather uncertain whether the break would come in the near future or whether prices would recover and would remain high for a few months longer. There was no sign of a break in May in any of the fertilizer materials. About the first of September the break came. Fertilizer manufacturers fearing a continuance of the shortage of material and difficulty of obtaining deliveries through car shortage made their contracts for materials at an earlier date than usual.

Along about the first of September at a meeting of the cottonseed oil manufacturers at Dallas, Texas, discussing the break in the price of cottonseed oil due in part to a lessening of the buying power of Europe and in part to the large imports of vegetable and animal oils, determined that instead of paying \$80 or \$90 a ton for cottonseed that they would pay not exceeding \$25 a ton. This brought about a break in the cottonseed meal prices. This was necessarily followed a few weeks later with a break in the prices of the other organic ammoniates including animal tankage and fish scrap. This was accentuated by the break in the prices of cattle and hogs, by the considerable decrease in the number of beef cattle, by the enormous crop of cotton and by the mild fall and winter which extended the pasture over an unusually long season. The foreign demand for sulphate of ammonia collapsed very suddenly and large stocks that had been contracted

for were thrown back on the American market so that the price of this commodity broke.

The Chilean Nitrate Syndicate had announced a price of \$4.30 per 100 pounds for nitrate of soda delivered in this country. We in Washington soon discovered that the English and French were very much dissatisfied with these prices and that the demand from Europe would be very much less than was expected. We found that this country was not disposed to pay such prices and as a matter of fact the high price was not realized and on the contrary the price of nitrate of soda broke.

Along in September, information was received by the Department that on account of the break in prices of farm products the farmers were very much dissatisfied with the high price of commercial fertilizers. The fall trade in commercial fertilizers was probably not over 50 or 60% of the normal.

In October, when the Department took up with the fertilizer manufacturers the prices for the spring season of 1921, the Department called attention to the fact that a break had started in the fertilizer material market, that this had not gone far enough to materially affect the basis upon which the larger manufacturers had purchased their material, but the Department warned them that they must proceed cautiously on a falling market and that these prices would not be justified to hold up to the following July if the prices of fertilizer materials continued to decline. Before these negotiations were completed on the basis that the fertilizer manufacturers submitted in October the price of fertilizer materials had sustained a very great decline. The farmers had not been able to take up their credit notes and showed a disposition to refrain from buying fertilizers for the spring of 1921.

To give you an idea of how severe this decline in the prices of fer-

fertilizer materials has been, I will give you the wholesale quotations of September 6 and of January 31. Nitrate of soda dropped from \$3.60 to \$2.90 per 100 pounds, sulphate of ammonia from \$5.50 to \$3.00 per 100 pounds, cottonseed meal from \$45 to \$30 per ton, dried blood from \$7.50 to \$3.75 per unit, fish scrap (dried) from \$7.50 to \$3.75 per unit, fish scrap (wet) from \$6.50 to \$4.00 per unit, animal tankage from \$7 to \$2.90 per unit, garbage tankage from \$16 to \$8 per ton, and 16% bulk acid phosphate from \$21 to \$15 per ton.

The fertilizer manufacturers were thus confronted with a very serious situation. The larger manufacturers had bought at high prices; the smaller manufacturers had not bought and were confronted with the difficulty of the credit situation.

The Department has urged the manufacturers to take the necessary losses to restore confidence and to restore the buying power by an adjustment of prices that would seem fair and equitable. They on their part were confronted with the serious credit situation and by the subnormal buying power which meant reduced sales and consequently higher overhead expenses and they have not felt that they were able or willing to meet the Department's views. They have deliberately decided to take their chances of getting what they can for their material and in the long run they have decided that they would come out better than if they met the situation according to the advice given by this Department.

The Department having no power to fix prices felt that it was only right and proper that the farmers should know the exact situation, which was presented to them in a statement issued on December 10. This statement was issued for the purpose of giving information to the farmers which would enable them to purchase more intelligently under the very disturbed conditions

that affected the trade and the expected wide variation in prices.

The market for commercial fertilizers is at the present time a buyers market. Materials and mixed goods can be purchased at most any price for large orders and for cash. Straight acid phosphate in bags can be purchased on the basis of the Atlantic ports for \$29, for \$25, or for \$15 per ton according to the conditions of purchase.

One of the gentlemen present has asked me for a statement of the present stocks of potash and of phosphoric acid. The potash situation has been very obscure. We have settled upon no definite price with the Germans or with the French. Our manufacturers have been wrangling for months as to the price and as to deliveries. There has been a belief throughout the country that very little potash has been imported because of this uncertainty as to the price situation. As a matter of fact, the Government figures show that there has been imported in the year 1920 195,000 short tons of pure potash (K_2O), that we have produced in this country probably 40,000 tons of K_2O and that there has been imported mainly from Chili some 2,000 tons of K_2O in the form of nitrate of potash. This makes a total importation and production of 240,000 short tons of actual potash. In 1913 the total importations were about 237,000 short tons of actual potash. We therefore had in this country in 1920 about the same amount of potash as we had in 1913. We have not been using potash as freely in 1920 as we used it in 1913 and therefore apparently have large stocks on hand. The price of muriate of potash on the first of September was around \$2.25 per unit. The price today is \$1.50 per unit and as the buying power is subnormal we do not know where this price recession is likely to stop.

With nitrate of soda the importation in 1913 was around 659,600 short tons while in 1920 the importation has amounted to 1,480,503 short tons,

so there is evidence of large stocks of nitrate of soda in this country at the present time.

In regard to the acid phosphate situation we estimate that there was produced in 1920 around 4,500,000 tons. This is about the pre-war basis of production but with the falling off of the buying power which has occurred this fall and winter the accumulated stocks are larger than usual, storage bins are overflowing and some of the acid plants are closing down.

You will be interested in a brief summary of the investigational work of the Bureau. Under normal conditions the supply of nitrogen has been barely sufficient to allow the normal production of mixed fertilizers with a $7\frac{1}{2}\%$ annual increase which has been going on in the fertilizer industry. If we were suddenly called on to extend the use of fertilizers westward in the Gulf States and westward in the North-central States we would not have sufficient nitrogen to meet the demands. The world realized twenty years ago that some artificial source of fixed nitrogen was essential to the world's agriculture. Even before the war, the Bureau of Soils began experiments on the fixation of atmospheric nitrogen. During the war these experiments have been pushed not only by the Bureau and by our own War Department, but by the principal countries of Europe. It is highly important that these experiments continue and that the industry be permanently developed.

The fixed nitrogen products that have been made are not particularly adapted to our present system of commercial fertilizers. Cyanamid can not be mixed except in small proportions with acid phosphate. Ammonium nitrate also reacts and can be used only in small proportions so that it seems that further investigations must be made of the character of the products that can be produced at the fixed nitrogen plants.

For a number of years, the Bureau has been working on methods of ex-

tracting phosphoric acid from phosphate rock without the use of sulphuric acid. The economical use of sulphuric acid requires a rock of considerable purity, noticeably free from iron, alumina and free lime. As a consequence of this, it has been estimated that about 68% of the phosphorus we mine is thrown on the dump heap as it is not adapted to the sulphuric acid treatment. We have developed a very promising method of smelting the phosphate rock in which these impurities are not detrimental and where the acid can be extracted cheaper than by the sulphuric acid method.

It may be perhaps a surprise to you to realize that we have in our commercial work only two acids--sulphuric and hydrochloric. Nitric acid has always been expensive because it has to be made from imported nitrate of soda. This new method of extracting phosphoric acid will give us a third acid that can be used for many of our commercial operations and will give us a byproduct that could be adapted to agricultural uses instead of waste products that are produced with sulphuric or hydrochloric acids. The fixed nitrogen plants can now produce nitric acid at reasonable cost so that we are likely now to have four acids for commercial use instead of two.

If the ammonia that is produced or can be produced from fixed nitrogen products instead of being absorbed as it is now in sulphuric acid can be absorbed in phosphoric acid and a part of the ammonia is converted into ammonium nitrate we get a concentrated form of nitrogen and phosphoric acid which together with potassium phosphate would enable us to make concentrated fertilizers and would put the fertilizer industry on a true chemical basis as one of the large chemical industries of the world and take it away from the scavenger industry it has been in the past.

President Taft sent a message to Congress advising that it was very

important that this country should possess its own source of supply of potash, if any such existed. Congress gave an appropriation and we have been working on this subject now for some years. Briefly this is what we find: in the kelp plant established on the Pacific Coast we have found that with the potash and the by-products derived from the kelp we can compete in price and quality with the salts produced in foreign countries. Theoretically from surveys that have been made there is shown a possibility of producing 1,000,000 tons a year of actual potash but possibly the actual production would never amount to more than 100,000 tons. This would be produced by a number of rather small plants extending along the Pacific coast and the coast of Alaska.

From the cement mills we estimate that we could recover 85,000 tons of pure potash and from the blast furnaces we estimate that there could be produced around 200,000 tons. The cement manufacturer and the steel manufacturer are not interested in the production of potash as it is too small an item for them to consider. Sentiment in this country, however, has decreed that the cement mills must abate the dust nuisance and in collecting the dust they collect the potash. The blast furnaces are finding that it is more economical and more efficient to use the dry method of cleaning their gases than the wet method. If they can be induced to clean their gases by the dry method of the Cottrell precipitator and remove their dust in this way this material can be taken by others and the potash recovered from it. This potash industry will be rather small in detail just as the by-product coke ovens in collecting their ammonia and fixing it in sulphuric acid to make ammonium sulphate is a small incident in itself connected with a major product.

In addition to this, we have the alunite deposits, the Searles Lake deposits, the Nebraska lakes and other sources of potash which can be mined directly or in connection with waste products that would seem to insure that a considerable part of the potash needs of this country can be produced in competition with foreign salts. Even if 50% of our needs were produced it would tend to prevent extortion in the prices of foreign material.

